

ALL ABOUT GRAMOPHONE PICK-UPS

Amateur Wireless

And Electrics

Every
Thursday 3^d

Vol. XI. No. 278

Saturday, Oct. 8, 1927

The "ALL-PURPOSE"
FOUR

and

"A.W." Gramo-Radio

MOVING-COIL
LOUD-SPEAKER

BOTH FULLY DESCRIBED IN THIS ISSUE

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electricity in the home**

Marconiphone Model 22, 2-valve receiver, illustrated here, and the other Marconiphone new season receivers are available for the ordinary battery-accumulator-installation.

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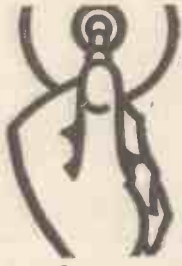
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The Sterling 'Baby' Loud Speaker, though costing only £2 7s. 6d., gives all the volume you want with a surprising fullness of tone.



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★
In every respect simplicity is the keynote of these modern receivers. Batteries and accumulators are completely eliminated. These sets simply to be connected to an ordinary electric light socket. There is no further trouble. Whenever the wireless is wanted you just switch on. And because the electrical energy is derived from the mains, upkeep is wonderfully cheap—less than that of one electric light.

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Amateur Wireless

and Electrics

The Leading Radio Weekly for the Constructor, Listener
and Experimenter

Vol. XI. No. 278

Edited by BERNARD E. JONES
Technical Editor: J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

October 8, 1927

Moving-coil Speaker—Leaky Studios!—A Watery Rumour— Towards Empire Broadcasting—The "All-purpose" Four

A Moving-coil Loud-speaker

FULL constructional details and working drawings are given in this issue of a moving-coil loud-speaker, which is described by the Technical Editor, Mr. J. H. Reyner, B.Sc. (Hons.), A.M.I.E.E. This new form of reproducer in conjunction with the "Gramo-Radio" Receiver described last week, enables gramophone records to be played with almost uncanny realism. The quality of reception of wireless music, as would be expected from such a combination, is as good as the best—and in these days that means something quite extraordinary!

The "All-purpose" Four

FOR listeners outside the "safe" range of a B.B.C. station (say 40 miles) or for listeners who require a number of distant stations on the loud-speaker in addition to "purity" reproduction of the local station, the AMATEUR WIRELESS Technical Staff are presenting full details on page 466 of a "straight" four-valver, which combines sensitiveness, volume, and high-quality reproduction in a particularly satisfactory manner. This receiver is a "new-season" set, and can be strongly recommended to the multi-valve devotee. Operating notes and a test report of the "All-purpose" Four, will be given in next week's issue.

Towards Empire Programmes

ANOTHER step towards Empire broadcasting is the sending of a representative to the Dominions and Colonies from the Wireless Association of Great Britain. In the meantime, Marcuse carries on and shows what should—and can—be done!

Leaking Studios!

A RUMOUR has been going the rounds that the reason why 5GB has a back-ground of 2LO—as

NOISES IN YOUR SET

Receivers sometimes suddenly develop crackling noises which, besides being annoying, are difficult to trace. Of the many possible causes of such noises, the most likely are a faulty H.T. battery, a loose connection, or partial breakdown either of the transformer primary winding of the loud-speaker winding. Dry-cell H.T. batteries often give rise to such noises when they are old. If you can borrow a battery known to be good try it and see if it cures the trouble.

As regards a loose connection examine the wiring of the set, the pins of the valves and coils, and make sure they are clean and a tight fit in their respective sockets.

The loud-speaker you can try on a friend's set and if it proves to be O.K. substitute it in your own set for the primary of the intervalve transformer thus working on the first two valves only. If the noises then disappear suspect the primary winding of the transformer being faulty.

received by some listeners—is that the studios at Savoy Hill are not sound-proof. The rumour-makers say, therefore, that whispers of 5GB programmes pass through the studio walls to the microphone supplying 2LO, and vice-versa, so causing the annoying background. The trouble is probably due to the use of unselective receivers.

Pity the Pirates

THE Post Office direction-finding van is now more active than ever, judging from recent reports, and the operators are tracking down illicit listeners with uncanny accuracy. Pirates beware!

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They Do Get Caught!

A WINTON amateur who was summoned recently for transmitting without a licence, pleaded that he was "carried away with enthusiasm," and the magistrate fined him two guineas and ordered his transmitter "to be carried away"!

Those News Bulletins!

AT the Press Conference held recently at Geneva, considerable attention was paid to the preparation and copyright of broadcast news bulletins. Is it too much to hope that as a result of the Geneva meeting the national news agencies will be able to afford the B.B.C. news items worth hearing.

A Use for the Bath!

A RUMANIAN engineer, having experimented on the reception of long wireless waves in a submarine, states that atmospheric are entirely eliminated when the craft is submerged, even in shallow waters. It is rumoured that radio fans now intend to make some use of their bathrooms!

A Tempestuous Winter?

THERE can be no doubt that the policy of the B.B.C., in pressing the P.M.G. to remove the ban on the broadcasting of controversial subjects, will be heartily endorsed by the great majority of listeners. The right of everyone to mount a soap-box and vent his opinions is a right we have, as a nation, long vaunted. Must we then be so carefully protected from opinions that might disagree with our own? Although the stimulation to thought may, at first, prove painful to some, we refuse to believe that anything more serious, such as inter-domestic violence, will result!



The "All purpose" Four

Incorporating Neutralised H.F. - R.C. and Transformer L.F.

Designed and Built by the A.W. Technical Staff

IN presenting full details of this new AMATEUR WIRELESS receiver to readers, the Technical Staff has endeavoured to produce a straightforward four-valve arrangement to combine maximum volume and sensitivity with first-class loud-speaker reproduction. Our tests of this receiver, which have been very exhaustive, in order

necting the aerial lead to No. 3 or No. 4, a selective auto-coupled aerial-tuning system is obtained. A .0005-microfarad variable condenser tunes this 250-550-metre Lewcos coil over the whole band of broadcast wavelengths.

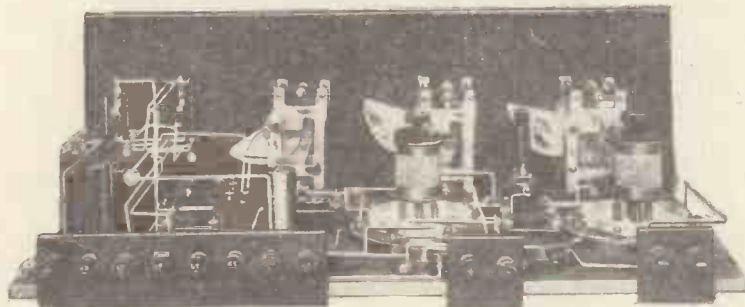
The companion coil to the Lewcos aerial coil is the 250-550-metre Lewcos split-primary H.F. transformer. But whereas in the aerial coil only four of the six-pin connections are utilised, in the case of the H.F. transformer all six connections have to be used. For the sake of explanation, the H.F. transformer can

of the winding which is connected through a neutralising condenser to the grid of the H.F. valve. No. 5, the other end of the primary winding, goes straight to the plate of the H.F. valve. The centre-tap connection, No. 4, goes to H.T. +1. The section of winding from 4 to 5 constitutes the actual "primary," whilst the section from 4 to 3 serves as an effective neutralising winding.

(2) Closely coupled to the primary section is another winding divided into two sections. From the terminal connection marked No. 1 to that marked No. 2 is the secondary winding of the transformer, which is tuned by a .0005-microfarad variable condenser.

(3) Lastly, there is the reaction-winding section (No. 2 to No. 6). At connection No. 2 the lower end of the tuned secondary and the top end of the reaction winding are joined. The free end of the reaction winding (No. 6) is connected through a .0002-microfarad variable reaction-condenser to the plate of the detector valve.

We have already referred to the fact that anode-bend rectification is incorporated. It will be convenient here to enlarge upon this particular part of the circuit. Readers are referred to the separate circuit diagram



The Layout of the "All purpose" Four is particularly neat

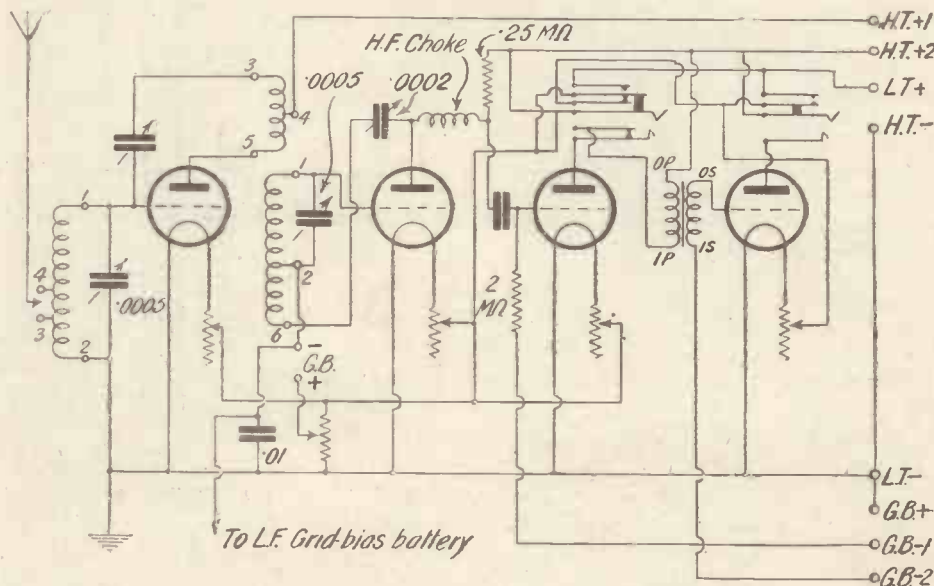
to leave no possibility of doubt as to the good performance of the completed set, have been extremely gratifying and give us confidence in recommending the "All purpose" Four.

Readers can rest assured that the finally-evolved arrangement which is depicted in the circuit diagram is one of the best "straight" combinations of four valves that it is possible to have.

Let us consider this circuit in detail. Firstly, there is a stage of neutralised H.F. amplification, followed by an "anode-bend" detector valve, which in turn is followed by a stage of resistance-capacity coupling. Finally, by means of the jack-switching arrangement, a stage of transformer-coupled L.F. amplification can be brought into action as required. A good balance between sensitiveness and "quality" reproduction is thus obtained by the first three valves, and where more "punch" is needed, as in the case of distant stations, the last power stage serves a very good purpose.

By adopting a standard H.F. circuit it has been possible to use Lewcos 6-pin coils for the aerial and H.F. tuning circuits. The aerial coil is the standard Lewcos split-primary aerial coil, with tapplings as numbered in the circuit diagram. By con-

be conveniently divided into three separate windings. (1). The centre-tapped combined primary and neutralising winding. The three connections to this coil are numbered 3, 4, and 5, and these correspond to the numbered connections on the Lewcos coil base. No. 3 is the top-end



The Theoretical Circuit Diagram

given of the "anode bend" portion of the complete four-valve circuit on a later page.

Provision has been made for two negative biasing adjustments one a "coarse" control and the other a potentiometer control. If the "coarse" control is used, only one grid-bias battery is required, but with the potentiometer control a separate 4½-volt grid-bias battery—apart from the "L.F." grid-bias battery—will be necessary.

By taking a G.B. — lead from the terminal marked — in the small diagram to the "L.F." grid-bias battery the "coarse" control of anode-bend negative bias is readily obtained, and in most instances this will give satisfactory results. But where a particularly fine adjustment of detector bias is required, it will be necessary to connect a 4½-volt G.B. battery between

out of circuit the primary of the L.F. transformer.

Messrs. Garnett Whiteley & Co. supply free instructions for mounting their jacks and these should be obtained. Between the first L.S. jack and the last valve is the 4-1-ratio L.F. transformer. In the anode circuit of the last valve is a single-filament jack. When the loud-speaker plug is inserted in this jack all four valves are in use and the filament circuit of the last valve is automatically completed.

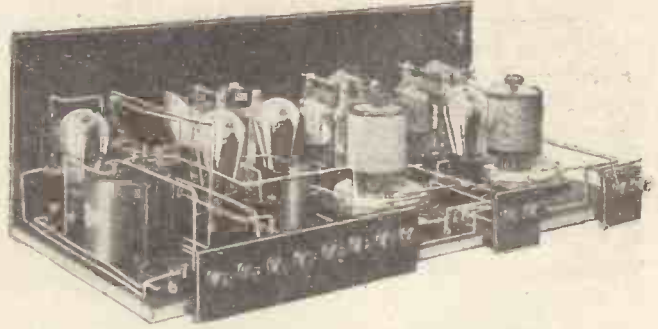
Each valve is provided with separate variable fixed resistor filament control and, as mentioned, the filament circuits are made and broken automatically by the L.S. jacks. Two H.T. + tappings are provided, one for the first valve (H.F.) and a common one for the last three valves. Two G.B. — tappings, one from the grid leak of the R.C. coupler and one from the secondary of the L.F. transformer, are also indicated in the circuit diagram.

Constructors of the receiver will need the following components:

Panel 21 in. by 7 in. by ¼ in. (Beco!, Peto-Scott or Ebonart).

Three terminal panels, one 8 in. by 2 in., two 2 in. by 2 in. (Beco!).

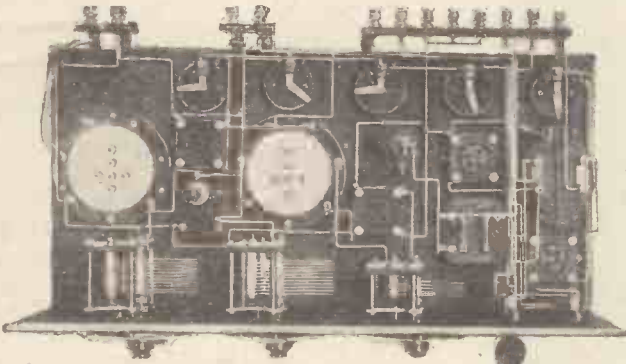
Baseboard, 21 in. by 10 in. (Carrington).



This photograph shows the coils in position

- Cabinet, (Carrington).
- Two .0005-microfarad variable condensers (Cylcon, Centroid, Burton or Ormond).
- One .0002-microfarad variable condenser (Cylcon, Centroid, Burton or Ormond).
- One .01-microfarad fixed condenser (Dubilier or Lissen).
- One resistance coupling unit (Dubilier or Lissen).
- Four valve holders (Benjamin, Lissen or Lotus).
- Four baseboard - mounting filament resistances (Lissen, Burton or Igranic).
- Neutralising condenser (Lissen, Peto-Scott or Wearite).
- B.B.M. potentiometer (Lissen or Igranic).
- H.F. choke (Wearite or Lissen, Watmel).

(Continued on page 502)

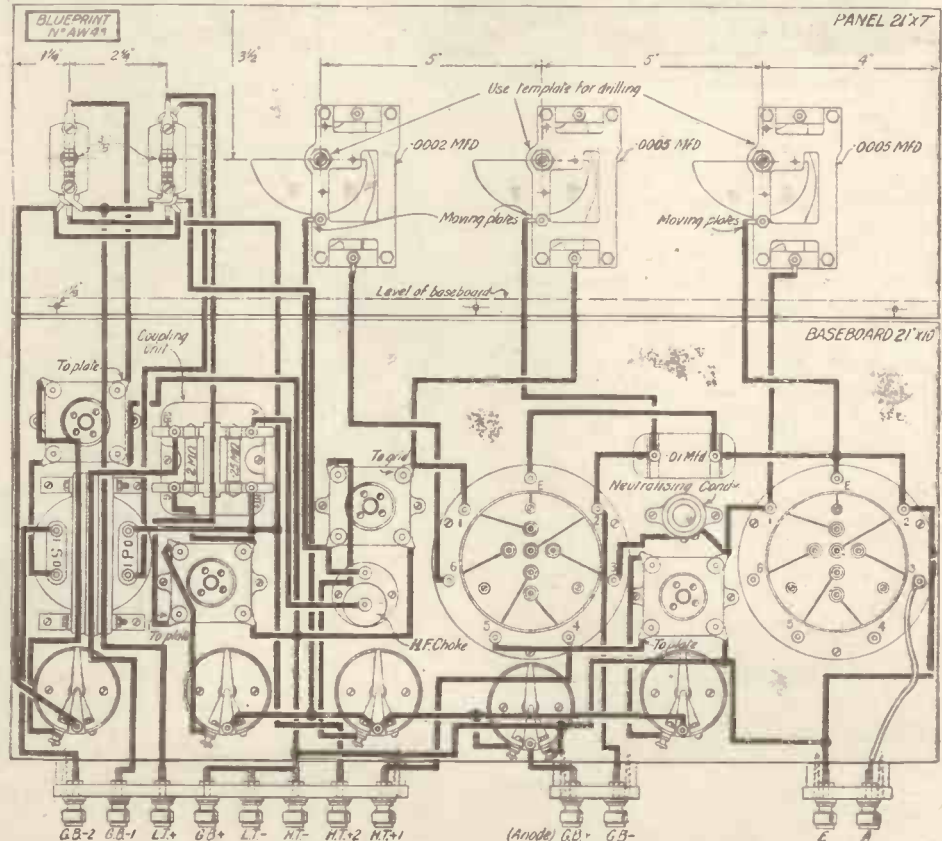


A Plan View of the "All-purpose" Four

the terminals marked — and + in the small diagram. The wander-plug adjustment of this battery will give a "coarse" bias and the potentiometer across the L.T. battery enables the final "fine" adjustment to be obtained. A .01-microfarad fixed condenser between the lower end of the tuning coil and the earth bus-bar is necessary to bypass H.F. currents which would otherwise have to contend with the resistance of the G.B. battery and the potentiometer.

L.F. Amplification

The L.F. amplifying stages combine volume with purity. Following the detector valve we have an R.C. stage which requires little comment. Note the H.F. choke in series with the plate of the detector valve and the anode resistance. This is required to divert the H.F. current through the reaction condenser and winding. With normal values of H.T. a .25-megohm anode-resistance is the highest recommended if smooth reaction is to be obtained—but Messrs. Dubilier supply a wide range of values of Dumetohm resistances for use in their R.C. couplers and readers can experiment with higher values if they desire slightly greater volume from the R.C. stage. A double-filament jack is interposed between the first amplifying valve and the L.F. transformer. Insertion of the loud-speaker plug into this jack puts the loud-speaker in the anode circuit of the third valve, switches on the filaments of the first three valves and cuts



The Wiring Diagram of the "All-purpose" Four (Blueprint available)

Thermion Looks Back at the Show

EVERY season for every reason, the Wireless Exhibition gets better and better. There was a time, a long while ago, when makers did not sufficiently study the requirements of the public. They frightened would-be purchasers by showing them sets so thickly studded with knobs that there was hardly any panel to be seen. They

A good example of the right sort of set is the "Interdyne" made by Messrs. R. I. & Varley, Ltd. This incorporates Dr. Robinson's wonderful new valve, which is in effect a self-neutralizing PM₅X. The single tuning knob operates the three variable condensers simultaneously and beyond this there is nothing to be seen on

off switch need be used. There are dozens of other simple sets including the Pye Three Valver, the Peto-Scott "Sociable Three," the McMichael "Dimic Four" and the Marconi Five Valver.

Progress

Looking at the sets generally I was struck by the advance which has been made in several directions besides that of simplicity. Manufacturers have turned their attention to producing the non-howling, non-radiating receiving set. This most desirable end is achieved in a number of ways. In some cases, such as the "Interdyne," special valves make the set automatically stable; in others, careful and effective neutralizing is used; in others again, the reaction arrangements are such that the set is practically howl-proof. Our makers were perhaps a little slow in making full use of the neutrodyne circuit; at last year's exhibition only a tiny percentage of sets with high-frequency amplification had any form of neutralizing. This year the great majority incorporate it and the circuits are well planned and well constructed.

Next I noticed with considerable pleasure the very great improvement that has been made in the general appearance of wireless cabinets. The gaunt severity of very early days gave way for a time rather to flamboyancy and twiddly bits. Now there is a general movement towards sane, sound, and genuinely pleasing designs. The receiving set after all has generally to form part of the furniture of a living room and there is every reason why it should be good to look upon.

Mains Sets

It is a pity that more of us have not electric light in our homes, and that the current supplies in this country are not yet standardised. These things have rather hampered in the past the production of receiving sets made to operate directly off the lighting mains. In this direction, however, makers have now gone right ahead and many of what our American cousins call the "socket-plug outfits" are splendid pieces of work, sure to make a strong appeal to those who have the necessary juice on tap.

The many difficulties contained in the



The National Radio Exhibition, 1927

housed them in hideous cabinets festooned with a trailing mass of various coloured leads. In those days one had to be something of an expert at tuning in order to be able to hear anything at all with the wireless set and something of an electrician, a plumber, and a witch doctor in order to be able to track down and rectify the little ailments to which it was liable. The public at large has never liked knobs in quantities and it does not possess or desire to possess the qualifications necessary for running complicated and finicky wireless receivers. It wants something so absolutely simple as to be foolproof; and this year it has got it.

We may take it that the average man or woman listens mainly to the programmes of the local station with those of 5GB or 5XX as alternatives. There may be an occasional radio trip abroad, but local reception is the main stand-by. What he or she wants is a set which will make it possible to switch on the music or switch off the talks by the simple flicking of one small knob. Many firms now realize this need and the result is that there are some delightful receivers at thoroughly reasonable prices.



The "A.W." Stand at the Exhibition

the panel but a volume control and an on-and-off switch. Tuning is thus as easy as rolling off the proverbial log. You turn the tuning knob until a desired station is heard; then you adjust the volume to your liking and that is that. If the set is left tuned to the local station, only the on-and-

problems of smoothing out mains hum and of eliminating ripple have been successfully tackled, and the plug-in receiving set is now a genuinely efficient piece of apparatus which reduces broadcast reception to the simple business of switching on or off. It is not even necessary to go to that part of the room in which the set is situated in order to do so. There is a simple remote-control device which enables switching on or off to be done and volume control to be carried out without the need of getting up from one's armchair by the fireside. Or if you prefer it you may house the set, not in one of the living rooms, but in the glory hole under the stairs or some similar place. In the living rooms, and the bedrooms too, if desired, are neat little jacks, and the simple insertion into one of these of the plug attached to the loud-speaker immediately brings the set into action. Really, wireless cannot get much simpler. The only possible improvement that I can think of is a device which automatically selects the best programme and tunes it in.

Screening

One is glad to see wider use made of compartment screening in sets employing one or more stages of high-frequency amplification. If the circuits are not very efficient, screening may not be necessary, but when big amplification per stage is secured by means of good circuits and genuinely low-loss coils and transformers stray couplings cause a very great deal of trouble. A very large part of the instability of the receivers in former years was due to this often unsuspected cause.

Many excellent devices are shown which enable the receiving set to be used in conjunction with a gramophone for the reproduction of records. I have not space to mention all of them, but two that pleased me very much were the reasonably priced Lissen and the extraordinarily ingenious Dubilier which works on the electrostatic principle and secures almost an entire elimination of needle-scratch.

Better Components

As a constructor I was perhaps more interested in the components shown than in the finished sets. Here again makers show that they genuinely realize the requirements of their public. The majority of the components are eminently practical, giving the constructor just what he wants for the particular job in hand. Take, for example, the problem of mounting a sloping panel. One used to be able to obtain nothing but right-angle brackets, so that the only thing for it was to make one's own by the somewhat laborious process of bending angle brass to the required shape; one can now obtain an adjustable angle bracket which allows this panel to be mounted at just the right slope.

Variable condensers of the two or three point fixing variety used to be rather a

bother to mount. One measured up the centres of the holes required ever so carefully—and then usually found that they were just that "tick" out which sufficed to spoil the whole job. An improvement was made when paper templates were issued, but these were not too satisfactory, since some little care was required when using them. Several firms are now packing with each variable condenser a neat little metal jig which makes it practically impossible for even the most mutton-fisted to go wrong in drilling the holes.

Variable Condensers

The variable condensers show great advances over last year's patterns, which were themselves extraordinarily good. There is a welcome tendency to make the variable condenser a genuine engineering job as well as a sound piece of electrical apparatus. Positive connections are the rule, and the bearings used are of a type that will stand up to hard wear. One noticed a complete absence of the flimsy vanes, both fixed and moving, that used to give so much trouble in the old days owing to the ease with which they became bent out of shape. I used to be rather shy of geared condensers, especially for short-wave work, since too many of them developed either backlash or a form of jumpiness that gave rise to microphonic noises. The modern geared condenser, however, has neither of these drawbacks. It is a properly designed instrument with a drive that is both perfectly positive and beautifully smooth.

Time was when the low-frequency transformer was rather under a cloud, not without good reason, for it was a generous producer of distortion. Modern transformers as seen at the Exhibition approach very nearly to perfection. The R. I. & Varley, the Pye, the Marconi "Ideal," and the Ferranti, to mention but a few, show almost perfect curves.

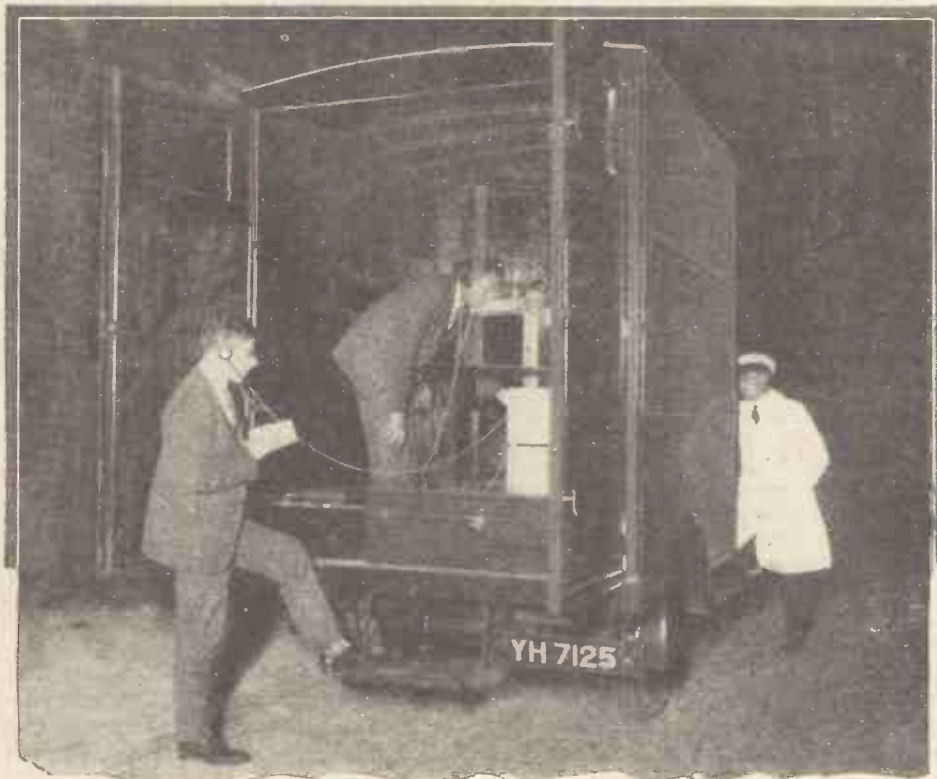
Many short-wave enthusiasts will be very much impressed with the Igranic short-wave kit, which allows a 15- to 70-metre set with an H.F. stage that really does amplify to be built at home at small expense.

Last, but not least, I must mention the excellence of the ebonite parts shown by the British Ebonite Company and other firms of manufacturers. Beautifully finished panels of standard sizes are obtainable remarkably cheaply in ebonite, of guaranteed quality; there is, therefore, no excuse for getting bitten by purchasing nameless "mud" from the little shop round the corner.

To sum up, the Exhibition shows that the way of both the man who buys his sets ready-made and of him who constructs his own has been made straightforward and easy by our go-ahead British manufacturers.

THERMION.

In America, three colours are used to identify valves. Orange represents audio-frequency amplifiers, green for detectors, and dark-red for general purpose valves.



A photograph, taken at night, of the B.B.C. Van which has been touring the Birmingham district making observations of the reception of 5 GB, in response to the many complaints of bad reception

IS IT ANODE BEND?

J. H. REYNER (B.Sc., Hons.)

Discusses an Interesting Question

IN the article describing the "Individual Five" receiver, which appeared in AMATEUR WIRELESS, No. 265, I mentioned that the grid leak on the detector valve could be connected to the negative terminal of a suitable grid-bias battery whereby a

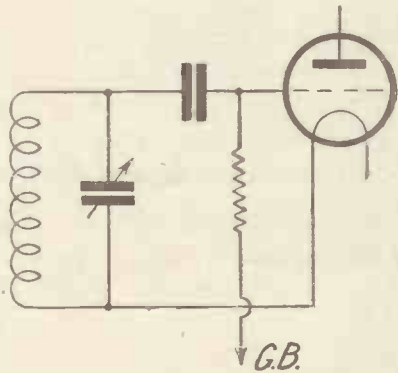


Fig. 1.—Cumulative Grid Rectifying Circuit

form of anode-bend rectification could be obtained. A correspondent has asked what is the significance of the expression, "a form of." Is there, he asks, any difference between an anode-bend rectifier operating in this manner, and one in which the grid end of the circuit is taken direct to the grid, the earth return being taken to the grid-bias battery in the usual manner?

The answer is "yes," and the difference can be seen by considering the question of rectification and the action involved. In an ordinary cumulative-grid rectifying circuit, such as is shown in Fig. 1, we interpose a condenser between the high potential end of the circuit and the grid. This condenser transmits the voltage through to the grid, which therefore fluctuates in potential in accordance with the signals applied.

Building Up

If the grid bias applied to the valve is such that the grid voltage becomes positive during parts of the cycle, then during this period electrons will be attracted in the grid and will charge up the grid condenser. During the remainder of the cycle, when the grid is negative, this condenser is effectively insulated, and in consequence is left at the end of the cycle with a small negative charge. The next cycle causes a further increment of electrons, and so the grid condenser continues to build up to a negative potential.

The effect of the successive charging of the condenser is to make the grid bias

slightly more negative, which means that the available positive grid swing of the signal is less and less at each successive cycle, a limit quickly being reached when the grid condenser has charged up to a potential equal to the maximum value of the signal. At this point the rectifying action increases, the voltage on the grid simply varying in accordance with the applied signals, but never becoming sufficiently positive to cause any grid current to flow.

This action is illustrated diagrammatically in Fig. 2. The effect of the decreasing steady potential on the grid is to cause a reduction in the steady anode current, although the anode current fluctuates all the time at H.F. This occurs every time a train of waves or a series of modulations occurs, the result being that the anode current fluctuates at a low frequency in accordance with the modulations impressed on the high-frequency waves at the trans-

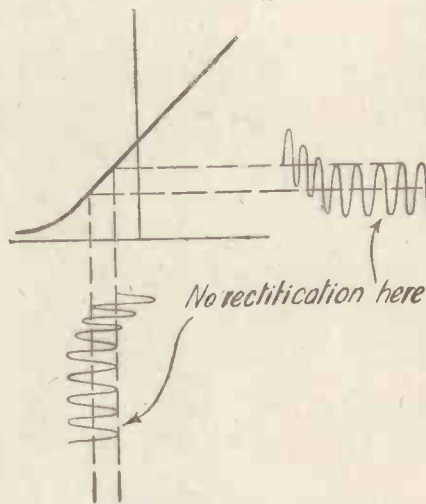


Fig. 2.—Effect of Successive Charging of Condenser

mitter, and it is thus that we are able to demodulate the high-frequency carrier wave and obtain audible signals.

Negative Bias

Now if we bias the grid initially with a negative grid bias such that no grid current can flow at any part of the cycle, it will be clear from Fig. 2 that no change in the steady anode current occurs due to the cumulative action of the condenser. Consequently no rectification takes place. As we increase the negative bias, however, we

gradually shift the operating point of the valve characteristic until we reach a condition where the characteristic is no longer sensibly straight, and we begin to run into the bottom-bend curvature.

In such circumstances, the fluctuation in the anode current will no longer be symmetrical, but will be rather larger in the positive direction than in the negative direction. Thus again we obtain a change in the mean anode current due to the presence of a signal and a rectification effect occurs. In passing, it may be remarked that this rectification occurs through an increase in the mean anode current, whereas in the case of the true cumulative grid rectification, a decrease in anode current is obtained. In certain circumstances, the two effects take place together, and actually cancel each other out, and with a certain value of grid bias it is possible to obtain no rectification whatever.

Reverting, however, to the main theme under consideration, we have seen that we are here obtaining anode-bend rectification, the mean anode current increasing due to the curvature of the characteristic at the particular operating point. As far as this action is concerned, therefore, the effect is the same as if we connected the circuit direct to the grid and took the earth end to the grid-bias battery. It will be clear, however, that the condenser inserted in the grid lead must have some effect. If we were to make this condenser very small, it is clear that we should, in effect, disconnect the grid lead entirely, and no signals would be obtained.

Voltage Drop

It is in this component that the difference between the two methods lies. We (Concluded on page 508)

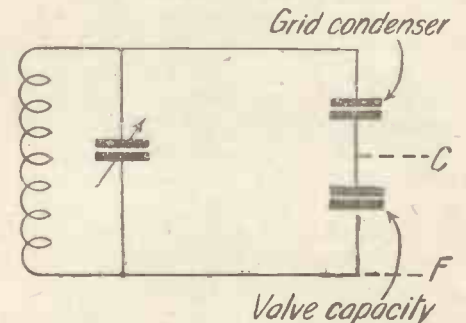
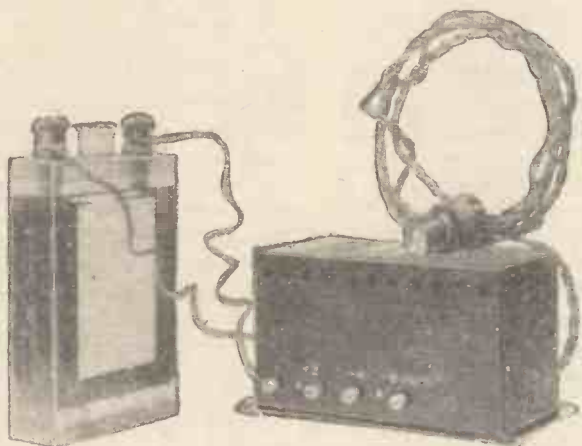


Fig. 3.—Diagram showing Difference between the two Methods

THE FERRANTI



PERMANENT TRICKLE CHARGER

Incorporating the Westinghouse Patent Metal Rectifier.

For Charging Accumulators at home
from the Alternating Current Mains.
Suitable for use on voltages from
200 to 250 and 40 to 60 cycles.

Price: 55/-

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CHEMICALS TO RENEW

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The Charger is simple and safe.

The FERRANTI Trickle Charger takes 12 watts from the Alternating Current Lighting Circuit and gives $\frac{1}{2}$ an ampere Direct Current to the Low Tension Accumulator, or during 83 hours' use the Charger will consume one Unit of Electricity from the A.C. Mains.

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Wireless Magazine

for October Now on sale, 1/-

Contains constructional details for making four new sets. Incorporating important new developments, each set is the very best of its type.

"MAINS THREE-VALVER" takes *all* current supplies from D.C. Mains.

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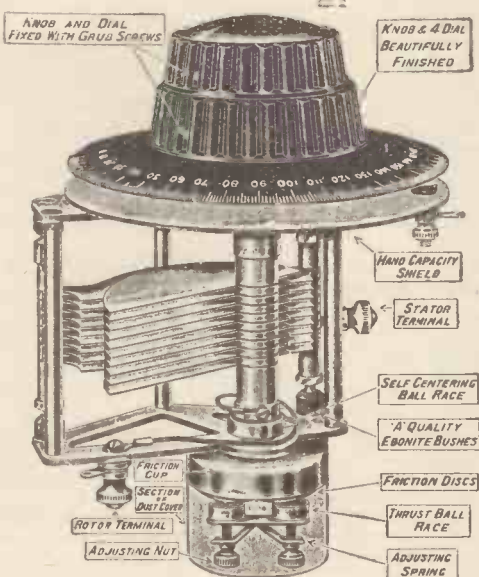
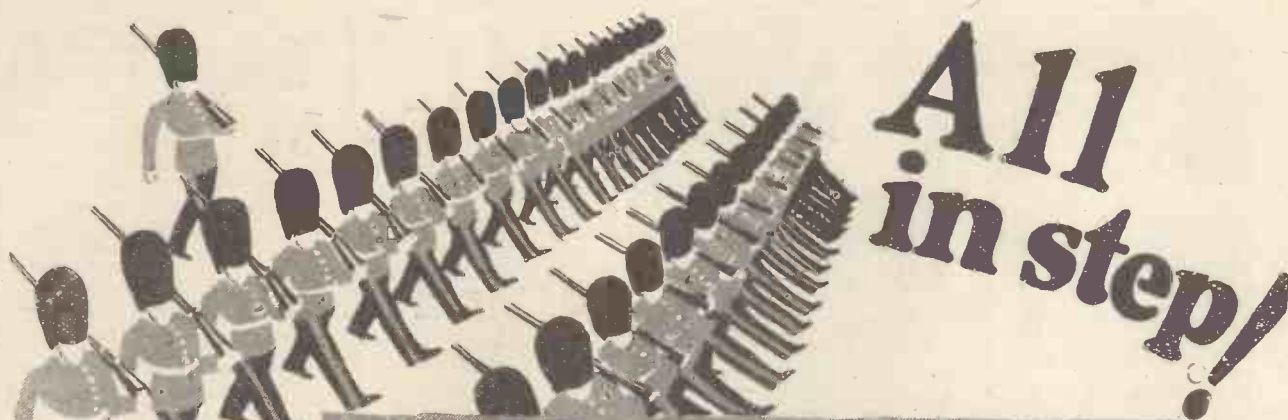
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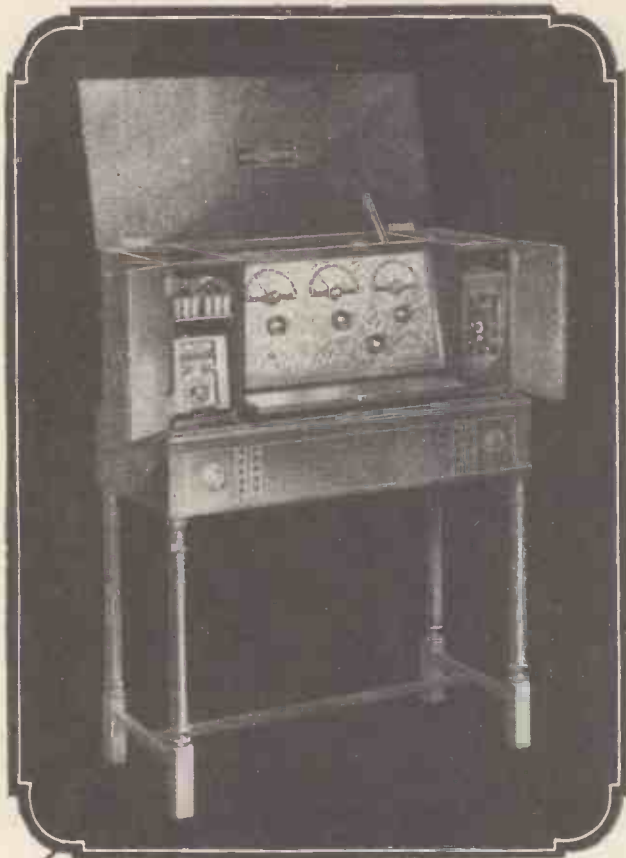
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MET-VICK

(COSMOS)

Wireless Sets
and components
for the new season

The illustration shows the new Met-Vick 5 with the eliminators contained in the side cupboards. It can be plugged into a lighting circuit just like any other electric appliance. If used with H.T. and L.T. batteries these can be accommodated in the cupboards. The circuit employs two phase-balanced and stabilised H.F. stages before the detector, and two resistance-coupled L.F. stages.

Operation is extremely simple, the local station can be easily cut out and a wide range of alternative programmes obtained. Special attention has been paid to running costs, which are remarkably low.

The Met-Vick 5 is a really beautiful instrument, and while a distinct advance on any 1926 model it still remains at a reasonable price. Obtain Leaflet 4117/9.

MET-VICK

BATTERY ELIMINATORS

"Met-Vick" Battery Eliminators are supplied in two models. The H.T.-G.B. Model can be used on various supply voltages of 40-100 periods. Grid Bias tapplings are provided at 5, 10, 15 and 20 volts. A high voltage (up to 250 volts) can be applied to the last valve. The L.T. Model gives an output of 5 amperes at 4 volts without hum.

List 7117/8

A.N.P. (Astatic-Non-Parasitic) COILS

These new "Met-Vick" products provide a clever solution of a difficult problem. They overcome, simply and efficiently, the three difficulties associated with H.F. amplification, namely, Magnetic coupling between coils, Stabilisation, and Parasitic Oscillation.

List 4117/8

RESISTANCE COUPLING UNITS

"Cosmos" ("Met-Vick") Resistance Coupling Units are well known to all wireless enthusiasts. The "V" type can now be obtained fitted with new "Met-Vick" A.C. Valve-holder. The latter is also supplied separately.

List 7117/8

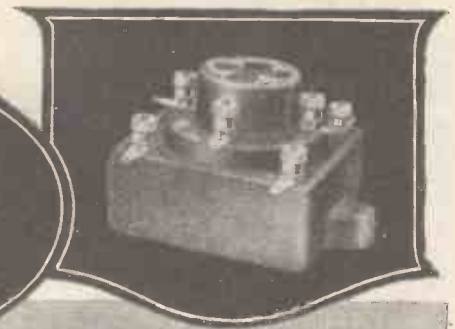
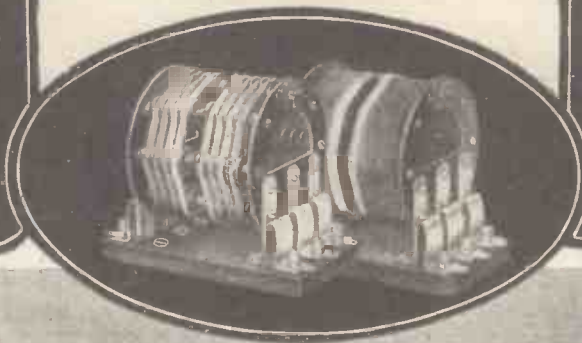
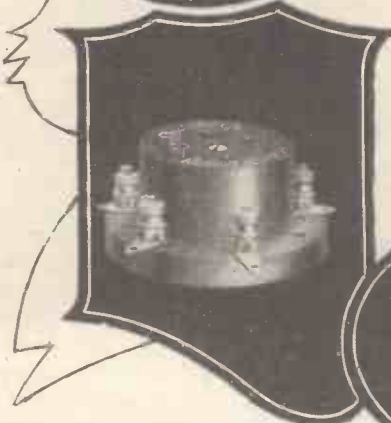
Have you seen the new Met-Vick A.C. Valves? Obtain Lists 4117/3 and 7117/8.

The various literature mentioned above gives full details and prices. Ask for your copies.

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On Your Wavelength!

The Dempsey-Tunney Fight

ALTHOUGH, no doubt, quite a number of radio fans listened to the thrilling descriptions of the Dempsey-Tunney fight transmitted on short-waves by at least two of the U.S.A. stations, it was left to the enterprise of Stuttgart to relay one of these transmissions, and to rebroadcast it on that station's ordinary wavelength of 379 metres. So far as I have been able to ascertain, no other European transmitter summed up sufficient courage to rouse up its listeners at 3.30 a.m., and as no notice had been given of Stuttgart's intention, the German broadcast came as an agreeable surprise to those fans who tuned in to WGY (Schenectady) in the faint hope of hearing something of this now historical combat! According to the American press, some eight people were reported as having died whilst listening to the running commentary on the match, of which four, through sheer excitement succumbed at the end of the seventh round! Whether this statement is to be taken seriously, I know not, but I fully expect that their sudden demise, in any case, will be attributed to wireless, in some way or other.

Winter Cometh

The act of putting back the clock when summer time comes to an end always gives the wireless enthusiast a joyous moment. First of all it makes him feel that the season proper really is here and secondly, it means that he can start his long-distance work, if he is given his wireless trips abroad, a whole hour earlier. The short-waveite benefits particularly. During the summer he begins his search for American stations at 11 p.m. on most nights, and at 10 p.m. on Tuesdays. Now that autumn is with us the opening time becomes 10 p.m. on the majority of nights and 9 p.m. on Tuesdays. I am bold enough to predict a wonderful season for the reception of short-wave broadcasting.

Things have been extraordinarily good throughout the summer whilst the number of new stations has been increasing with amazing rapidity. This winter there will be plenty to hear on the short waves and I do not think that we shall have much to grumble about in the way of signal strength. Many new stations are opening in America, a good deal of short-wave work is likely to be done in European countries and we shall hear quite a lot of the Australian and Japanese stations. If you do not already possess a short-wave receiving set, the best advice that I can give you is to build one without delay. The cost is small but you will find that the pleasure to be reaped from short-wave reception is enormous.

2NM's Times

In case you should care to listen to the transmissions of that good sportsman, Mr. Gerald Marcuse, who is at present conducting Empire broadcasting entirely off his own bat, here are the days and times at which he is usually to be found working. On Tuesdays, Thursdays, and Saturdays, he is on the air from 6 to 7 a.m., whilst on Sundays he transmits both at the same hour, and between 4 and 6 p.m. in the evening. Irregular transmissions are also given between 9.30 and 10.30 p.m. The power at present used is 1-kilowatt. The normal wavelength is 32.5 metres, though sometimes a wavelength of 23 metres is used. If you know the tuning for 2XAF you will have no difficulty in picking up 2NM on 32.5 metres, and conversely once you have found 2NM, a very slight increase in the dial readings will put you on to the wavelength of 2XAF. Similarly with the 23-metre transmission, which is just a little above the wavelength of 2XAD.

Skipped Distances

One of the most curious points about short-wave transmissions is that there is usually a fairly wide area round the station inside which little or nothing is to be heard. The waves apparently travel upwards and outwards until they strike the Heavenside layer and are deflected back by it to earth. The point at which they reach the ground again may be a hundred miles or a great deal more than that from the transmitting aerial. The queer thing is that it is easier to receive stations such as KDKA, 2XAD, 2XAF, WLW and the rest in this country, than it is in many parts of America. For this reason and also because there was until recently little to hear from outside, short-wave reception has not made much headway in the States, except, of course, among the amateur transmitters who confine themselves chiefly to the morse code.

Now that PCJJ, ANH, and the Australian stations are at work, interest on short-wave reception is rapidly increasing over there and the wireless papers are publishing constructional details of suitable sets. Nobody yet appears to have beaten the modified Reinartz circuit for short-wave work. All the best short-wave receivers use it. The great thing is so to arrange the circuit that one set of plates in each tuning condenser is earthed. Make these the moving plates and there is almost an entire absence of hand-capacity effects.

New Valve Wonders

I have just received from Holland particulars of two wonderful new multi-grid valves that have been placed on the market

by the Philips' people. The first of these is a high-frequency amplifier which does not appear to differ greatly from the Round screened-grid valve in its characteristics. It is provided, though, with a four-pin cap containing the filament, control, and screen-grid pins whilst the plate connection is made to a terminal mounted at the top of the bulb.

Three Grids

Still more interesting to my mind is the super-power valve containing no less than three grids! One of these is connected within the valve to the filament, the second is the control grid and the third has a terminal to which is taken a lead from a tapping of the high-tension battery. Though it is a genuine super-power valve, taking a negative bias of as much as 15-volts on the control grid, this valve has an amplification factor of 100, or about thirty times as much as the normal triode super-power valve. A Dutch friend who has actually used the valve tells me that loud-speaker reproduction with it is an absolute revelation. The highest and lowest notes are perfectly brought out, and speech is crystal clear.

Right Ahead

It is strange that America should have allowed herself to get left by the Western world in the matter of developing tetrode and pentode valves. The rudiments of the idea are due to two American inventors, Schaffky and Hull. In the States, however, these valves appear to have remained purely in the state of interesting laboratory curiosities. Thanks to the genius and energy of Captain Round our own country has gone ahead and we may say with pardonable pride that America has nothing at present to touch our four-electrode high-frequency amplifiers.

Press-the-button Wireless

Much has been said, and written, of late about the extraordinary simplicity of modern sets, "one touch of the switch and in comes the music," and that sort of thing. Possibly not every reader has realised that any set can be made to operate equally simply for the reception of the local station by the simple expedient of fitting it with filament-control jacks. I cannot myself think why these are not more widely used, for there is no more convenient wireless fitment.

Myself, I use a two-stage low-frequency amplifier. One stage is amply sufficient for the local station, for 5GB or for 5XX. I want the other for bringing up some of the weaker foreign stations to respectable loud-speaker strength. On the panel are

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On Your Wavelength! (continued)

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two jacks of the filament control type. The first is of the kind known as the double-filament jack and the second is of the single-filament variety. Inserting the loud-speaker plug into either of them means that the batteries are switched on, thus throwing the set into action. Similarly, withdrawing the plug puts everything to bed. When I am away from home I simply leave the set tuned to the local station and all that anyone has to do if he wishes to hear broadcasting is to thrust the loud-speaker plug into the first jack.

Little Things that Matter

The importance of testing out thoroughly a new H.T.B. before it is brought into use was brought home to me the other day. Even in the best regulated factory one that is not quite up to the mark will occasionally slip through the testing room and its use may produce pretty queer results if it is hooked up to the receiving set. Here is what happened to me. A new 100-volt battery of first-rate make arrived. The voltmeter placed across its extreme terminals registered just over 100 volts, so all appeared to be well. But when it was connected up it became immediately evident that something was most emphatically not as it should be.

Distortion occurred which nothing sufficed to cure. I unhooked the battery and ran over it socket by socket with a high-resistance voltmeter. The mystery was cleared up. Between the sockets marked 54 and 57 the reading obtained was not 3 volts but 1.95. There was a faulty cell there, and its presence sufficed to set up a high resistance which produced unwanted couplings. New batteries as a matter of fact generally read slightly over their nominal voltage, so that if you merely take the E.M.F. between extreme terminals you may fail to detect a small defect such as this in one part of the battery.

Queer Isn't It?

Talking the other day to a man who does a large business in the sale of electrical measuring instruments, I was rather surprised to learn that about ninety per cent. of the voltmeters sold for wireless use are of the very cheap moving-iron pattern. Excellent reasons why these voltmeters should not be used, at any rate for testing out the high-tension battery, have been given with some emphasis by more than one writer. To put the matter briefly, the average moving-iron voltmeter passes a current of about a quarter of an ampere for a full scale deflection, and 250 milliamperes is a little too much to take from a standard high-tension battery. It may be argued that no great harm is done since this excessive current flows only for a moment,

With the majority of moving-iron instruments this is not the case. The needle waggles and waggles and waggles before it comes to rest, so that the process of taking a voltage reading may require some little time.

A Queer Cause of Noisiness

A friend came to me the other day, greatly perturbed about the performance of his short-wave receiving set. Though no loose connection of any kind could be found, and though the variable condensers were of excellent make, crackles and bangs occurred when the dials were turned. Now, as a rule, when this kind of thing happens it is due to a slight looseness in the bearings of the spindle carrying the moving vanes and the advice usually given is to fit a spiral contact of the watch-spring type.

One could not give such advice here, for the good reason that there were already contacts of this kind which were obviously in perfect order. It was a rather puzzling business, but investigation showed that as the dials were turned in a clockwise direction the spirals were wound up so that turn after turn came into contact with those below it. Every time such a contact took place there was an answering crash. The moral is that for short-wave work loose spirals containing plenty of turns should be used and that they should be so arranged that no turn ever touches another. A queer little point, but a very important one.

When Signal Strength Went West

It is curious when you are looking for trouble how easily some points that ought to be pretty obvious can be missed. A friend complained to me recently that his signal strength had been declining for some time and had eventually become so poor that he was at his wits' end. He had had his accumulator freshly charged, he had carefully tested out his high-tension battery, and by trying his valves on other people's sets had made sure that they were up to the mark. He had in fact taken a great deal of trouble and spent no small amount of time in trying without any success to discover the reason why his loud-speaker had become a soft-speaker.

Moved by his entreaties I consented to go round with him to see if I could suggest anything. When we got to his house he put his hand on the aerial-earth switch, which is mounted on the wall outside. When he had turned it over so as to bring the aerial into action I told him that there was no need for us to go any further. "Mean to say," he asked, "that you have discovered the fault without even looking at the set?" I replied that I was pretty sure that I had, and pointed to the switch. We have, as you may have noticed, had a

little rain this summer and this switch, owing to its exposed position, was in a thoroughly dull and dirty condition. The arms of a knife switch, which is frequently used, keep themselves fairly bright since they rub against the clips every time that a change over is made. But the wire connections to the switch are apt to get into a thoroughly bad state. We cleaned up the connections carefully, tightened them up and then went in to see whether any effect had been produced on the receiving set. On switching on we found that signal strength was as good as it had ever been.

A Big Step Forward

I suppose that the weakest point in the armour of wireless has always been high-frequency amplification. When you come to compare dispassionately the H.F. side of the set with the L.F. side, you will see what an enormous difference there is in point of efficiency. With the note-mags. we obtain an excellent degree of pukka amplification without the necessity for making use of any adventitious aid such as reaction. Good L.F. transformers used with suitable valves or proper resistance couplings with high- μ valves allow an amplification of thirty or so a stage to be obtained with complete stability. But on the H.F. side the genuine amplification has hitherto been pretty small.

A Simple Test

You can test this out for yourself by putting in a shorting plug in place of your reaction coil if you use one, or by setting the reaction condenser at zero should you employ capacity control. Take a run round with the set in this condition, and you will find that very little comes your way. We are, in fact, doing pretty well if we obtain on the H.F. side a genuine amplification of about eight per stage, and most of us have to rely far too much upon reaction to get amplification big enough for reasonable signal strength. A good deal of very useful work has been done recently by several investigators into the matter of obtaining a good degree of amplification in the high-frequency stages, and much progress has been made in this direction. In the very near future the high-frequency amplifier is likely to be brought up to something like the same state of efficiency as the note-mag. This most desirable result will be very largely contributed to by the use of the screened-grid valve, in which plate-grid capacity with its accompanying evils is almost entirely eliminated. On the broadcast band a real H.F. amplification of forty per stage has been accomplished, and much more is possible on the longer waves.

THERMION



CHARGING accumulators from A.C. lighting mains can be very easily and cheaply done by using a vibrating-reed rectifier, which combines the desirable features of simplicity in construction, the need for very little attention, absence of mess as with chemical rectifiers, and low initial cost. The object of this article is not to describe the construction of such a rectifier, but to give suggestions with regard to the use of the instrument and to give particulars of suitable step-down transformers to work with it.

The rectifier consists of a steel reed, tuned to vibrate at the frequency of the A.C. supply (generally 50 cycles in house-lighting systems). The reed is polarised by a permanent horse-shoe magnet, and it vibrates under the influence of an alternating electromagnetic field, created by a core of soft-iron wires wound with a coil of wire and connected to the A.C. supply. The circuit is as shown in Fig. 1. In this, figure c consists of a core of iron wires about $\frac{3}{8}$ in. in diameter, wound with No. 36 d.c.c. wire, the winding being about $1\frac{1}{2}$ in. long and 1 in. in diameter. The reed is of steel, .025 in. thick, $3\frac{3}{4}$ in. long, and $\frac{3}{4}$ in. wide. It is supported at the fixed end by a screw in a slot in the reed, so that the length of the reed free to vibrate may be adjusted to allow the reed to vibrate at the proper frequency.

In the writer's case the charging unit when first set up was very troublesome, and it was found very difficult to eliminate sparking at the contacts. The result was that the contacts became pitted, which made adjustments more difficult and also the unit would not run for long without attention. Another difficulty arose. The contacts are adjusted so that the make and break occurs when the supply volts are equal to the back voltage of the cells on charge, so that a sparkless break is obtained. This is done at first, but as the cell charges up, its back voltage rises correspondingly and sparking commences. All these sparking troubles were entirely eliminated by connecting a 2-microfarad condenser (Mansbridge) across the contacts (shown dotted in Fig. 1). With this modi-

fication the rectifier will now run indefinitely without any attention whatever. In fact the contacts of the writer's charging unit have not been touched for months, the apparatus being merely switched on as required without further adjustment.

It is, of course, necessary to transform the A.C. supply voltage down to a value slightly higher than that of the cells to be charged. Information of suitable trans-

formers seems rather scarce, so that details of suitable ones for supply voltages of 205 and 110 volts are given below.

205 Volts 50 Cycles

The following transformer was designed for an output of 20-30 watts without heating up, and works very well.

The core is made up of rectangular laminations of soft iron, the laminations being separated by thin sheets of paper. Before winding it is assembled as in Fig. 2, and is 10 in. long by 1.5 in. wide by 1 in. deep.

The windings may be put directly on to the core, over a few layers of waxed paper, or by first winding the coil on a former and then inserting the core. The winding is 4 in. long in the centre of the core. The primary consists of 1,700 turns of No. 30 d.c.c. copper wire, a layer of waxed paper being put on between every layer or two of the primary.

The secondary turns depend on the voltage required, the writer's transformer having a secondary of 110 turns of No. 18 s.c.c. wire, thus giving 13 volts. Tappings are made at 42 and 70 turns, thus giving 5, 8, 7.5, 12.5, and 13 volts, according to the tappings used, the secondary voltage, of course, being approximately in the same ratio to the primary voltage as the number of turns in use in the secondary is to the number of turns in the primary.

The primary and secondary must be well insulated from each other by several layers of waxed paper. When the primary and secondary are in place, the ends of the core are bent over each side and the laminations interleaved as in Fig. 3 and bound tightly together with insulating tape. The finished transformer is shown by Fig. 4.

110 Volts 50 Cycles

Core, 10 in. by 1.5 in. by 1 in.; primary, 1,265 turns of No. 28 d.c.c.; secondary, 11.5 turns per volt required—for example, 58 turns for 5 volts, 115 turns for 10 volts. The construction is exactly the same as in the preceding case.

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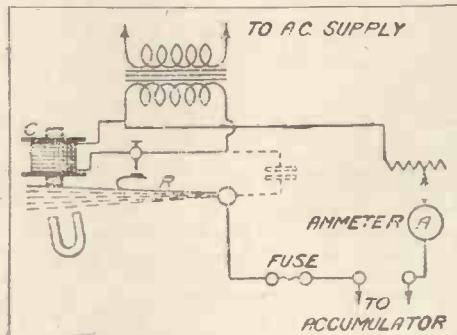


Fig. 1.—Circuit Arrangements

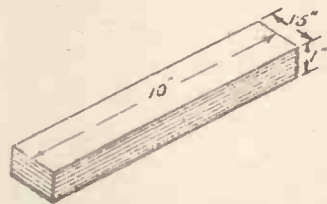


Fig. 2.—Details of Transformer Core



Fig. 3.—Transformer Core Wound

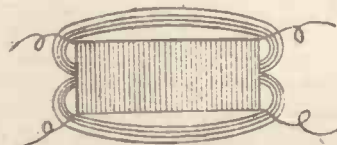


Fig. 4.—The Completed Transformer

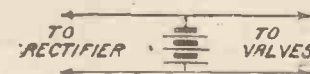


Fig. 5.—Accumulator Connections

LETTERS TO THE EDITOR



The Editor does not necessarily agree with the views expressed by correspondents.

Correspondence should be brief and to the point, and written on one side of the paper.

The Dempsey-Tunney Fight

SIR,—The great fight for the world's heavy-weight Championship was received here, on our two-valve set with the greatest of ease, every word being heard at good strength.

At 3 a.m., Friday morning (9 p.m. Eastern Standard time), we tuned in the American short-wave broadcasting station, 2XAF, on 32 metres, and the announcer told us we were now being switched over to the ring-side, Soldiers Field, Chicago, where we should hear a running commentary on the great fight between Gene Tunney and Jack Dempsey.

A moment later, and here in Harrow we could actually hear the murmurs of the crowd, rattles, whistles and newspaper boys creating a terrific din at the scene of the fight in Chicago.

The announcer said there was not a vacant seat and about 170,000 people were present, the gate receipts were approximately 2,800,000 dollars. The weather was cold and cloudy, but the slight rain which had threatened to spoil the fight, had just ceased and the preliminary bouts were now taking place.

At 9.55 p.m., E.S.T., a great roar was heard as Jack Dempsey entered the ring and took his seat in the south-west corner, but five minutes later an even greater ovation was given as Tunney entered.

Everyone was excited and even the announcer's usually steady and clear voices trembled and shouted as Round One of the great fight commenced. The gong was heard and blow by blow we heard how the fight was proceeding. It was evident that Tunney was getting the best of it. It was Tunney's round.

As Rounds Two, Three and Four passed, Tunney got by far the best of it and his right hooks frequently punished Dempsey about his face, and Dempsey was getting flushed and was breathing hard, whereas Gene was quite cool.

Round Six was even and there was great excitement during Round Seven, when Jack Dempsey knocked Tunney down for a count of nine (this being the first time he had been floored during his career) with three sharp lefts to the jaw.

The last two rounds were easily Tunney's as he followed Dempsey round the ring and got through blow after blow on his bad

eye. The gong ended the fight and the crowd cried "Gene" and so Tunney retained his title.

The conditions for the reception of American stations on this night were fortunately very good and four stations broadcasting the fight were heard.

The receiver used was a two-valver with Reinartz circuit. At 5 a.m., after having heard a few words from both Tunney and Dempsey, the broadcast ended.

T. A. STUDLEY, F. C. STUDLEY (Harrow).

MARCONI ROYALTIES—A CONCESSION

An important concession to buyers of new valve sets is announced by Marconi's Wireless Telegraph Co., Ltd. As is well known, a royalty of 12s. 6d. per valve-holder is payable to them on every receiver, but under the new scheme a listener buying a new set to take the place of an old one will be credited with the amount of royalties he has already paid.

In order to claim this credit, it is necessary to fill up a form, to be obtained from the dealer supplying the new receiver, and to return the licence plate attached to the old set. Thus a listener already possessing an old three-valve set can buy a new five-valve receiver, and pay the royalty on only two valves; that is, he has only to pay a new royalty of 25s., as against 62s. 6d., a saving of 37s. 6d. The concession also applies to a buyer of a new set containing the same number of valves as the old one.

SIR,—On Thursday evening, Sept. 22, I made your "Plug-in Short-wave Two" described in AMATEUR WIRELESS, No. 270, with the intention, or rather hope, of listening to the big fight.

I roughly hooked it up, using old-style condensers, home-made choke, and home-made coils. When finished, I tried it out, and the first thing I got was an experimental transmission from the Royal Air Force station at Kidbrooke on 41 metres. Shortly after I got 2XAF fairly good. I went to bed satisfied and got up at 3.30 a.m. and tuned into the same station and heard one of the preliminary bouts, and then the big fight, without missing hardly a detail. I also heard Tunney saying "hello" to his many friends at the conclusion of the fight.

L. B. (Newcastle-on-Tyne).

2LO's Piano Transmissions

SIR,—If one may judge from your correspondence columns, the subject of 2LO's "blasting" piano is one of interest to a very large number of listeners. So

far, most of the blame has been placed on the studio or the transmitter, but a conversation I had the other day with a piano tuner seems to throw fresh light upon the problem.

This summer, he said, has been particularly harmful to pianos, which are thrown out of tune by both heat and damp, and especially by conditions of the "close and clammy" variety. This tuner claimed to have experience of Savoy Hill pianos, and he said that, possibly owing to the drapings and the artificial methods of ventilation necessary to exclude unwanted noises, a broadcasting studio was worse than most places. Under such conditions, pianos used for concert purposes should be tuned every day, if not oftener, if called upon for important performances.

As he had no reason to suppose me an influential member of the B.B.C., this was a perfectly genuine view, and it makes me wonder whether the distortion could be cured not by tuning the receiver or the transmitter, but by tuning the piano.

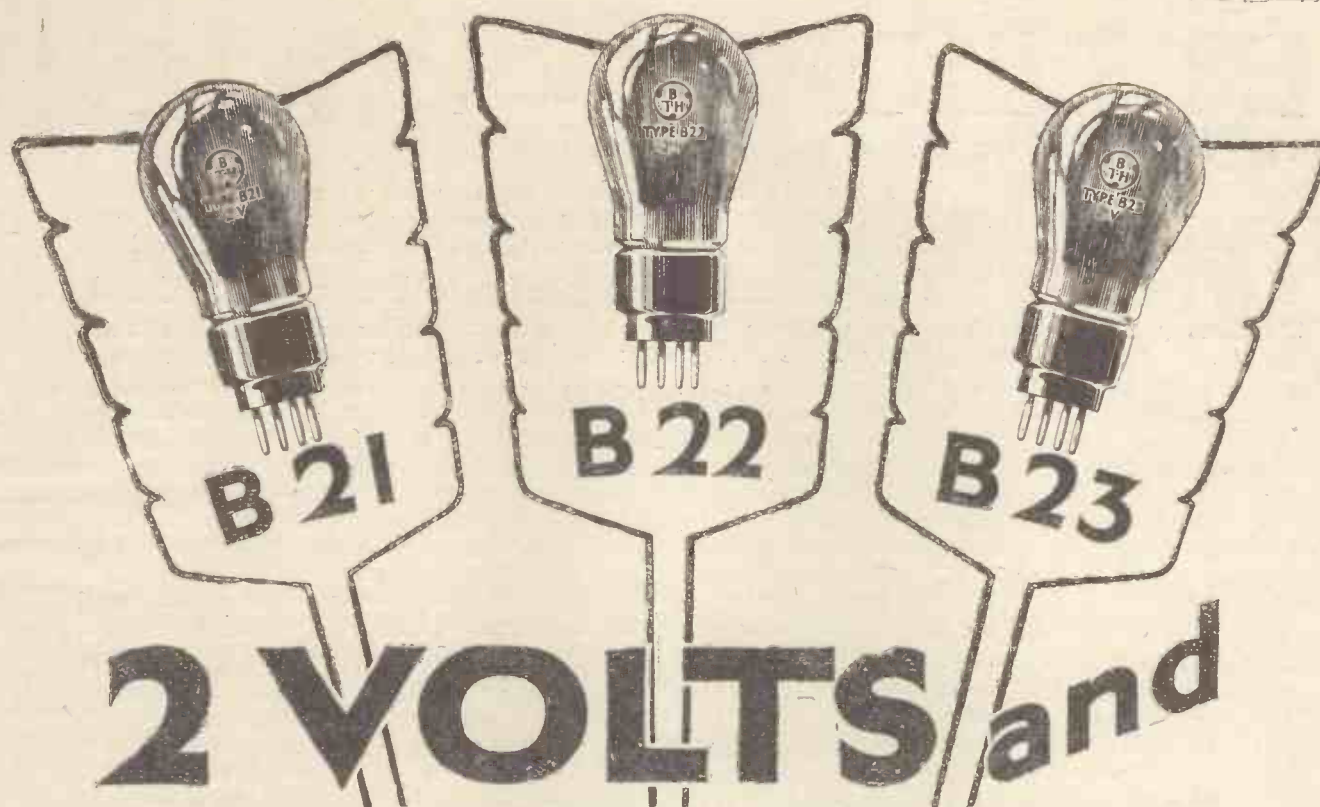
P. R. L. (Manchester).

The Aeranode Short-wave Set

SIR,—Please allow me to congratulate Mr. G. C. P. Braun on his short-wave "Aeranode" set. I built this in a rather drastically modified form and am delighted with results. With regard to the 2 in. by 2 in. condenser plates I used two fixed and two moving square-law vanes with ordinary spacing washers to give a slightly bigger tuning range. Plug-in coils are used for the choke, but I daresay a standard article would work better. A 35 Edison-Bell was found best for about 22 metres, as a larger one brought in the local station. With one stage of L.F. amplification, the set is perfectly stable and oscillates beautifully, no primary shunting condenser being used.

With regard to stations received, 2XAD on about 22 metres, 2 XAF on 32 and a station relaying KDKA, on about 20, are all well received although the first mentioned is the star, being clearly audible all over a moderately-sized room on headphones. PCJJ, in Holland, comes in at small L.S. strength, although his times are not at all settled, and it is a matter of luck if one happens to be on when he is working.

C. S. B. (Warrington)



B.T.H. Valves are not "made-in-a-hurry" valves, much time and money—involving long and patient research work—having been expended in the search for the perfect 2-volt valve. At last it is an accomplished fact—a perfect 2-volt valve—and B.T.H. Not just one type—but a complete 2-volt series is now available, comparable in performance and length of service with the best of the six-volt range.

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|------|------------|------------|-----------|-------------------|--------------|--------------|----------------|
| B21 | H.F. | 2 | 0.1 | 40 to 150 | 16.0 | 32,000 ohms. | 10 6 |
| B22 | G.P. | 2 | 0.1 | 40 to 100 | 7.5 | 14,000 ohms. | 10 6 |
| B23 | Power Amp. | 2 | 0.2 | 40 to 100 | 6.0 | 8,000 ohms. | 12 6 |

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N



A MAN who has all the appearance of a prospective buyer lingers around a stand on which a full series of two-, three-, and five-valve receivers is exhibited. An enthusiastic salesman pounces down upon him:

ENTHUSIASTIC SALESMAN: Here, sir (*placing his hand lovingly on a highly polished mahogany case*) is the latest in selective receivers, which will give you the alternative B.B.C. programmes at any time, anywhere, on the loud-speaker.

PROSPECTIVE BUYER (*doubtfully*): Well, I live within two miles of the London station.

E. S. (*who is taking no risk*): Quite so. This set will bring in 5GB whilst 2LO is transmitting. (*He gives the case another loving pat.*)

P. B. (*still doubtfully*): Either station at will?

E. S.: Most certainly. Here, sir (*he opens the case*), you will see . . .

P. B. (*unconvinced*): At any time?

E. S.: That is exactly what we claim for the set. This circuit . . .

P. B. (*apparently still unconvinced*): Even in the middle of the day?

E. S. (*patronisingly*): At any time, sir.

P. B. (*stubbornly*): What—at, say, 11 a.m.?

E. S. (*with a smile, as if to clinch the argument*): Easily.

P. B. (*triumphantly*): But 5GB doesn't work at 11 a.m.! (*He retires with glee, chuckling to himself.*)

Collapse of Enthusiastic Salesman, who, later, revives in a favourite Exhibition annexe, just before closing time!

(2)

(*Scene*: Another stand which specialises in wireless receivers fed from the mains, and advertises this fact in a blaze of coloured lights. An elderly lady, flanked by a younger female companion, both attracted as moths are by a candle, stop in front of the exhibits.)

ELDERLY LADY (*in an undertone*): From the mains? (*turning to female companion*). You know, dear, I promised Fred I would buy him a set; he's been such a good boy lately and is so clever with his hands.

HER NIECE, the young female companion (*shyly*): Yes, auntie.

E. L. (*touches one of the receivers with her*

gloved forefinger): This is a very pretty thing, isn't it?

H. N. (*absentmindedly, having caught a glimpse of the Anzorad salesman*): Yes, auntie. (*Anzorad Salesman approaches.*)

A. S.: This set may interest you, madam, and I feel sure would make a suitable present for the young man to whom you referred. There are no messy accumulators, no dangerous batteries (*pointing to placard*), "Radio from the Mains." One plug, and Europe is within your reach. (*He beams on the old lady and adjusts his tie.*)

E. L. (*thoughtfully*): But what if I don't want Europe? My nephew is of a serious mind, and the B.B.C. programmes are so instructive.

A. S.: In that case, madam, the set will give you excellent reception of your local station. Allow me to . . . (*he glibly recites the quality of the "Radio from the Mains" marvel.*)

E. L. (*to her companion*): I hope you have listened attentively to this gentleman, dear, for it's all Greek to me.

H. N. (*who cannot keep her eyes off the Anzorad Salesman, abstractedly*): Yes, auntie.

E. L. (*doubtfully*): I think this might suit us. I have always been afraid of these funny batteries. (*To her niece*): You know what a shock the vicar's wife got last winter.

H. N. (*remembering how easily the vicar's wife is shocked*): Yes, auntie.

A. S.: No danger of anything like that, madam. This set would not shock anybody. (*He chuckles at his own joke, but finding no response, begins to discuss terms with E. L.*)

E. L. (*as an afterthought*): But why do you call it "Radio from the Mains"? (*Pointing to flexible lead and plug*): On what tap do you fix this wire?

A. S. (*somewhat startled*): Tap, madam? No, no, you connect this plug to your electric mains.

E. L.: Electric, but you said that . . .

A. S.: The mains, madam, the electric light circuit. You see . . .

E. L. (*huffily*): Don't talk rubbish, man, we have no electric light in Little Bumble-oombe.

A. S.: But what do you . . .

E. L.: We have no gas, we use lamps.

A. S. (*breathless*): And the mains?

E. L. (*as she leaves the stall in disgust*): Water, you simpleton. I've always heard people say they fastened a wire to a tap!

(3)

(*Time*: 9.30 p.m. *Scene*: Another stand, showing richly-carved pillars, supporting heavily-cased and luxuriously nickel-plated wireless receivers. On a specially-built rostrum, an umpteen-valver, replete with all the knobs and switches calculated to thrill the heart of any enthusiastic beginner. The sets are advertised at high prices, and for the last half-hour a somewhat bored but superior-looking salesman has spent the time in adjusting the angles at which a few expensive lithographed cards and price lists have been artistically distributed over the counter and small tables. His face perceptibly lights up as a well-dressed youth and a "pretty little thing" casually saunter towards the stand.)

WELL-DRESSED YOUTH (*adjusting an eye-glass*) to P. L. T.: Topping sets, what? Would look well in the flat, eh?

PRETTY LITTLE THING (*doubtfully*): Would they match the suite, do you think?

SUPERIOR-LOOKING SALESMAN: We have them in all styles, madam. Queen Anne, Sheraton, Renaissance, and all the Louis. This set (*approaching the umpteen-valver*) is the most perfect yet produced. It will . . .

W. D. Y.: I say, old chap, will it bring in all those funny little places abroad?

S. L. S. (*with due conviction*): We can tune them in, sir, at the rate of fifty an hour.

P. L. T. (*enthusiastically, squeezing her companion's arm*): Oh! George, how ripping! Wouldn't it be wonderful to hear the places we're going to on our honey . . .

W. D. Y. (*hurriedly*): I say, old thing, what about America?

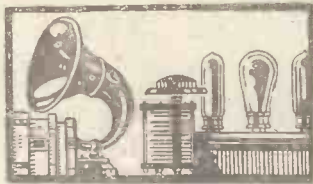
S. L. S. (*convincingly*): The greatest feature of this receiver is its remarkable capacity for eating up distance. I can assure you, sir, that if, on any night, you care to try for the U.S.A. stations, you . . .

P. L. T. (*duly thrilled*): Oh! George. Fancy hearing mother in New York!

S. L. S. (*who fears a contradiction might imperil a favourable decision*): Practically any broadcasting station . . .

W. D. Y.: Precisely, old chap, but how do you get them?

(*Concluded on page 505.*)



PRACTICAL ODDS & ENDS

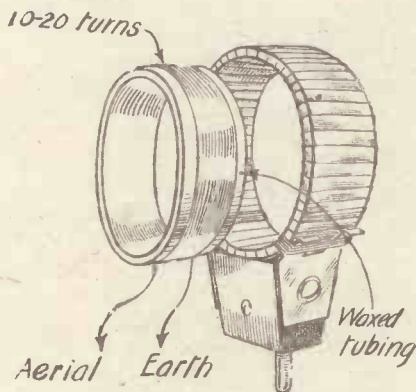


Aperiodic Coupling with Standard Coils

IN the following simple way all the advantages of aperiodic aerial coupling may be obtained with standard plug-in coils.

Obtain a piece of dry waxed cardboard tubing with an outside diameter slightly less than the inside diameter of an ordinary plug coil, and of the same width, and wind on ten to twenty turns (according to the degree of selectivity required) of 22 s.w.g. d.c.c. wire, taking care to leave three or four inches of wire at each end for connection purposes.

The adaptor is now ready for use. Plug a No. 50 or 60 coil in the aerial socket of your set and slip the adaptor inside it. Connect the aerial lead to one end of the



An Easily-made Aperiodic Coupler

adaptor winding, and the earth lead to the other end, and also to the earth terminal of the set.

The operation of the set will be the same as before, except a smaller reaction coil will probably be required and the tuning will be much sharper and selective.

L. E. G.

An Efficient H.F. Choke

THE chief advantages of the choke shown in the photograph are that it is unusually efficient and cheap to construct. It can be made in the following manner.

A base piece 2 in. in diameter, and two pieces 2 in. at the base, 3 in. high and $\frac{1}{8}$ in. at the top, are cut out of stiff but not thick cardboard. The shape of these pieces can be seen from the photograph. In the sloping sides of each of the last two pieces, five equally spaced notches about $\frac{1}{4}$ in. deep are cut.

These pieces are then dovetailed together in "egg-box" fashion, that is, they are cut up the centre, one from the base and the other from the top. This will ensure rigidity, and they can then be glued to the base piece.



Winding the Choke

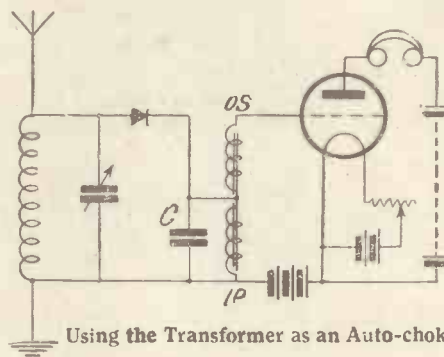
The choke is wound with No. 38 or 40 d.s.c. wire, the end first being secured through a small hole in the base, and winding being done coil by coil. The number of turns to each coil is not important, winding being carried on until the notches are filled. The last turn is secured through a small hole in the top.

The choke is now completed and can be conveniently fixed to a baseboard by means of small screws or tacks through its base.—S. O.

An Auto-choke Coupling

WHEN using an L.F. amplifier after a crystal set, it is desirable to employ a transformer of high ratio.

Few experimenters, however, have one with the high step-up necessary of 6 or 8 to 1. In the absence of such an instrument



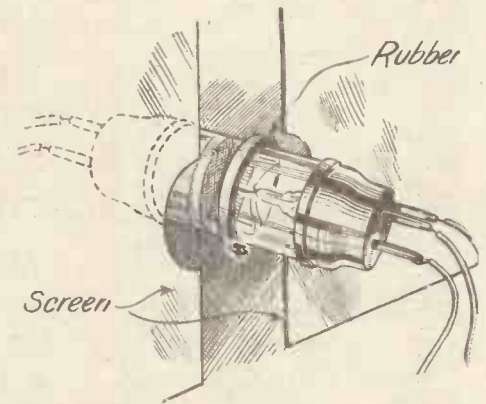
Using the Transformer as an Auto-choke

the difficulty can be overcome by using the ordinary low-ratio transformer wired up as an auto-choke as shown in the circuit herewith, when it will give an increased step-up. In this way, for example, a step-up of 5 to 1 can be obtained from a 4 to 1 transformer.

The condenser *c* is a H.F. by-pass condenser. It is, of course, bad practice to put a condenser across the secondary, but in this case it is only across a small part of the secondary, and if its value is not more than .0003 microfarad—ample for the purpose—the effect will be quite unnoticeable.—P. R. L.

An Original Tetrode Valve Holder

FOR best results the new S625 should be mounted in a firm but anti-microphonic holder with as little capacity loss as possible. The following method has been found extremely effective, and an additional advantage is that it makes holders at each end of the valve unnecessary.



An Anti-microphonic Tetrode Valve holder

A disc of fairly soft rubber, about $3\frac{1}{2}$ in. in diameter and 1 in. thick, is obtained, and a hole slightly less in diameter than the diameter of the valve cut in it. The periphery of the ring has a slot cut in it, into which the copper screen is to be pushed. The valve is inserted in the ring, and if the hole has been cut to the right size the elasticity of the rubber will cause it to grip the valve firmly.

The hole is then cut in the copper screen where required, about one-sixteenth of an inch larger in diameter than the hole in the rubber, the screen cut into halves through the centre of the hole. The two halves are then pushed into the groove in the rubber ring and their edges soldered together.

The leads to the valve are then soldered direct to the pins, the absence of any holder being, of course, a material factor in reducing capacity effects. L. B. P.

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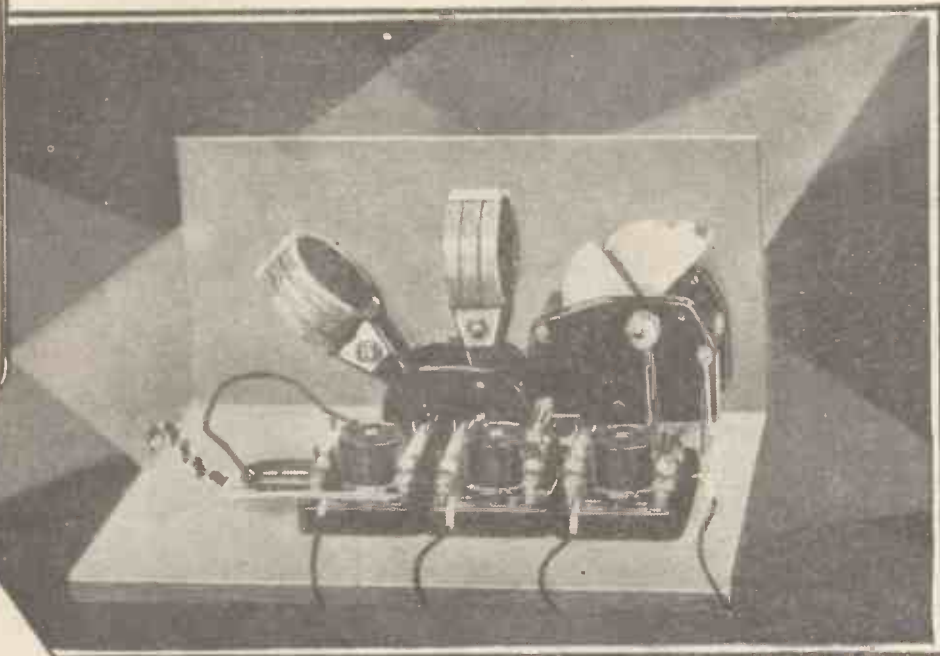
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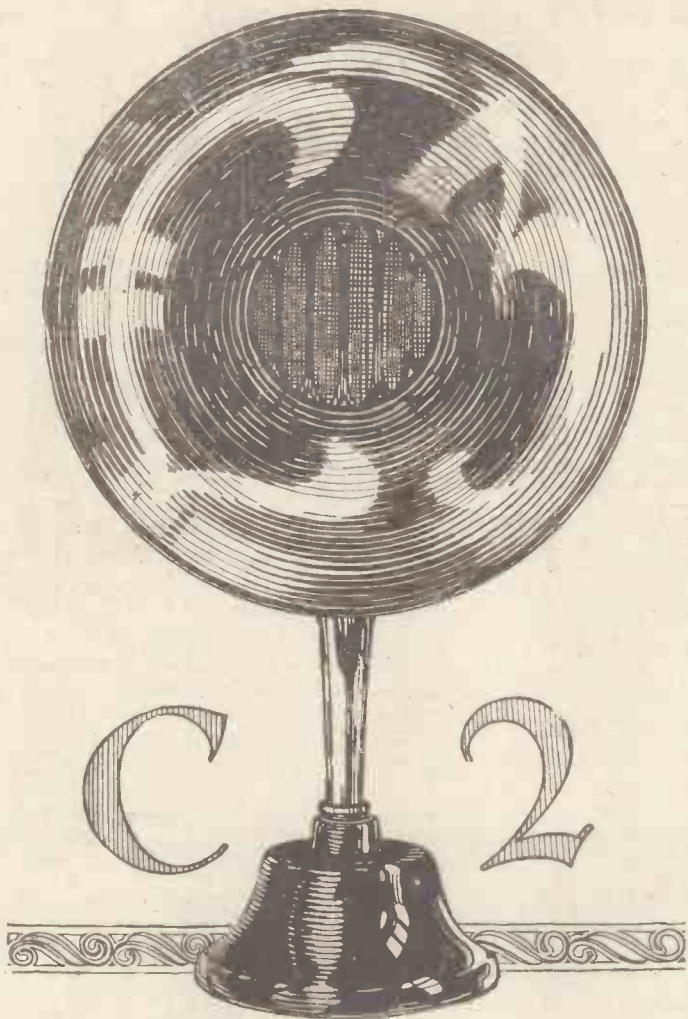
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The British Thomson-Houston Co., Ltd.,

"The Evening News"

on the 21st September said under the heading "SEVEN DAYS' WONDERS OF THE NATIONAL RADIO EXHIBITION"—

"From what I have heard in advance I should say that the largest feature of the Show will be loud-speakers, of every imaginable shape and of some shapes that you would never dream of in a life-time.

... There will be loud-speakers hanging from the wall and standing on the floor, loud-speakers that look like clocks and vases, and waste-paper baskets and cigar boxes. ... There will even be a few that LOOK LIKE LOUD-SPEAKERS"—

and they might have added—AND AT LEAST ONE THAT LOOKS AND SOUNDS LIKE A LOUD-SPEAKER, the

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What is a Gramophone Pick-up?

An Explanatory Article by J. H. Reyner, B.Sc. (Hons.), A.M.I.E.E.

A GOOD deal has been written lately concerning the use of electrical arrangements for playing gramophone records. To do this, the ordinary sound box of the gramophone is replaced by an electrical sound box or "pick-up" as it is called, and leads are taken from this to the input of a suitable amplifier, whereby the signals are amplified up until they are strong enough to operate a loud-speaker. It is interesting to consider how such an electrical pick-up works.

A gramophone record, as is well known, consists of a disc of hard moulded material, containing a spiral cut which runs round the record, gradually working its way towards the centre. The gramophone sound box is provided with a needle which rests in this cut, and as the record is rotated, so any variations in the cut are transferred to the

the note; the more rapid the vibration the higher the tone.

Speech or music, therefore, is made up of a combination of air vibrations of different frequencies. If we are to reproduce such vibrations from a gramophone record, then the needle of the gramophone must be caused to vibrate in an exactly similar manner. Such motion will then be transmitted to the sound box, where it will set up air waves which will be a copy of the original.

The groove in the record is not a true spiral, but deviates from side to side, the extent of the deviation depending on the strength of the signal and the number of deviations in a given time depending upon the frequency of the note to be recorded. A diagrammatical illustration of this principle is shown in Fig. 1.

The Record

Everything depends, of course, in the first place, on the record itself. If the cut on the record is not a really faithful reproduction of the original sound, then no amount of care of the reproducing system will improve the results. Modern records are made by electrical processes, the cutter which engraves the original record being actuated by electrical currents obtained from an amplifier. Amplifiers for transforming speech or music into electrical currents have been brought to a high pitch of efficiency, very largely owing to broadcast activities. This new system has enabled distinctly better records to be obtained.

Gramophone reproduction, telephony and broadcasting are all made possible because it is found that if, instead of transmitting each frequency individually, we transmit the composite wave produced by the mixture of all the individual vibrations, then we obtain an exactly similar

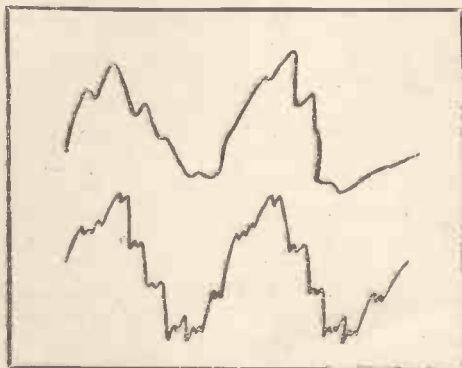


Fig. 2 & 3—Curves of Good & Bad Reproduction

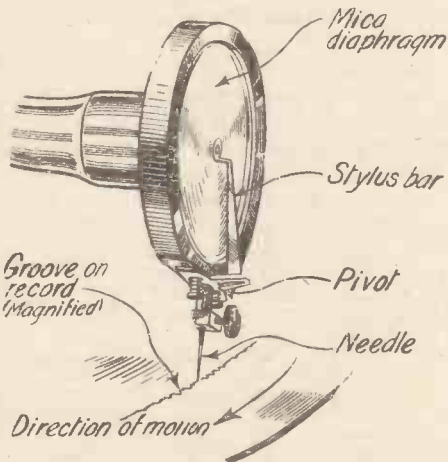
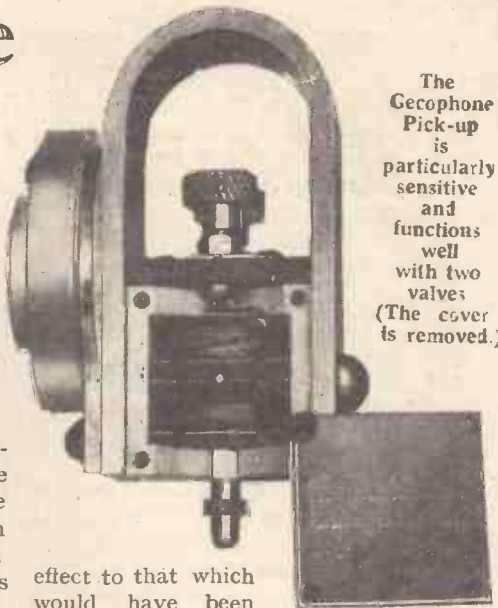


Fig. 1—Action of Gramophone

sound box, where they set up sounds which are amplified in a suitable horn and emerge into the room.

Sound Waves

Sound waves consist of air vibrations taking place at a more or less rapid rate, the actual rate of vibration determining the pitch of



The Geophone Pick-up is particularly sensitive and functions well with two valves (The cover is removed.)

effect to that which would have been produced by the transmission of each vibration individually.

The faithfulness of the transmission, however, obviously depends on how accurately we follow out the "envelope" as it were, of the vibration. Fig. 2, shows a wave form, representing a portion of a musical transmission. It will be seen to be

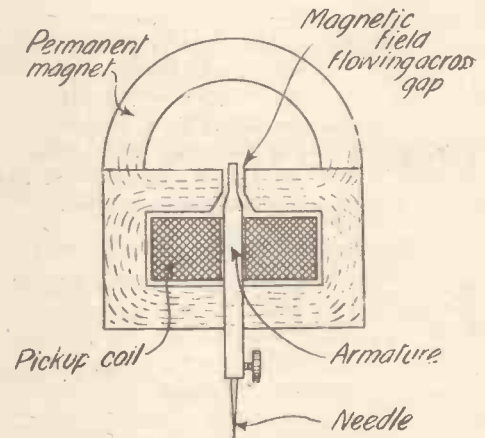
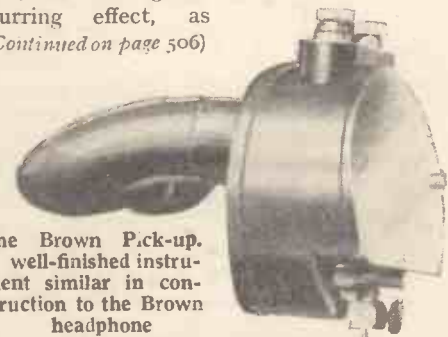


Fig. 4—Details of pick-up

irregular in character showing that it is made up of a large number of different frequencies. For perfect recording, it is necessary to have all these frequencies reproduced. If the recording mechanism (or the reproducing mechanism for that matter) is unable to respond to all the various frequencies, we shall get a slurring effect, as (Continued on page 506)



The Igranic Pick-up. An excellent low-priced instrument!



The Brown Pick-up. A well-finished instrument similar in construction to the Brown headphone

"Simpler Wireless":

The "Cancel-out" of Ripple Explained

By J. F. JOHNSTON

NOT the least interesting feature of the "Simpler Wireless" system of mains-driven wireless is the fact that the normal 200-250 volt D.C. electric-lighting supply does not need to be smoothed in any way before being applied to the sets, while in the case of rectified A.C., the "smoother" required may be of the very simplest description. This point is obviously of great importance, both commercially and to the home-constructor.

It has been stated in previous articles that the reason why no smoothing is necessary in the case of a D.C. supply, is that any variations in the mains voltage act on the various electrodes of the different valves in such a way as to cause changes of potential which, by their nature, cancel out. In this article an attempt is made to give a fuller explanation of the effect.

However, it is often extremely difficult, especially when dealing with the exact way in which valve circuits function, to reconcile precise scientific accuracy with a simple explanation. Let me, therefore, anticipate any super-critical readers by stating that the following explanation, while broadly correct, is not intended to be a complete treatise on the subject.

Effects of Grid and Plate Potentials

First of all consider the effect, on the anode-current of a valve, of altering the grid and plate potentials either separately

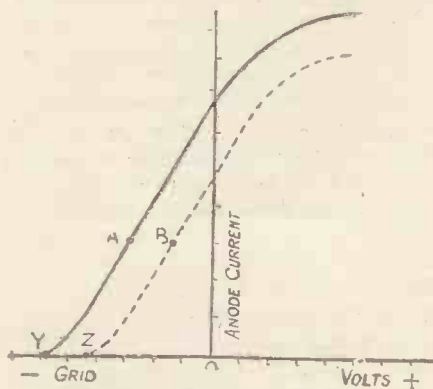


Fig. 1.—Effect of Plate Voltage

or simultaneously. The full-line curve in Fig. 1 represents the characteristic curve of a valve with a certain plate voltage, while the dotted line represents the curve of the same valve when the plate voltage is reduced.

If the valve is being operated at point A, on the full-line curve, and if the plate voltage is then reduced until the curve is

as shown by the dotted-line, the anode current will be less than it was before. But it will be possible by reducing the negative bias on the grid of the valve (making the grid more positive) to move the operating point of the valve to point B on the dotted curve. Then the anode current will be exactly the same as it was at first.

In other words, it is possible to reduce the plate voltage applied to a valve and

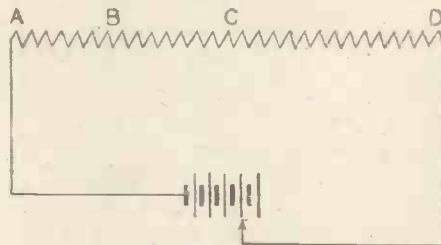


Fig. 2.—Effect of Resistance

yet keep the anode current unaltered, if the grid is at the same time made a certain degree more positive. The amount by which the grid potential must be altered depends upon the amplification factor of the valve and will, within limits, bear a definite relationship to the amount by which the plate voltage is altered.

Looking again at Fig. 1, suppose that the valve is a detector working as an anode-bend rectifier and that it is operating at point Y, on the full-line curve. Then if the plate voltage is reduced it will be possible, by making the grid sufficiently positive, to move the operating point to Z, on the dotted curve, to ensure that the valve still works efficiently as an anode-bend rectifier without any alteration in the amplitude of the anode current.

Up to now we have only considered matters when the plate voltage is reduced. If it is increased the grid will have to be made more negative in order to keep the anode current constant. The important point is that the effect on the anode-current of any variation in the plate potential can be counteracted by an alteration, of opposite sign, of the grid potential by an amount depending upon the amplification factor of the valve and bearing a definite relationship to the amount by which the plate voltage is altered.

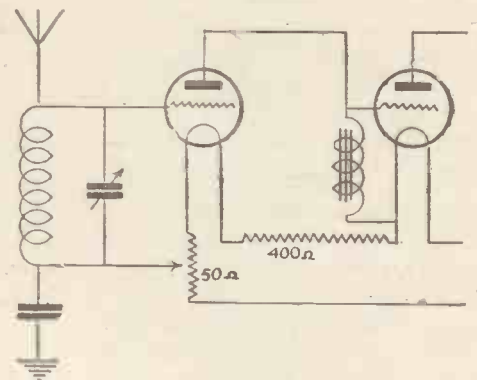
Now look at Fig. 2, which shows a resistance connected across a source of electrical supply, the voltage of this supply being variable. There will be differences of potential between points A, B, C, and

D, on the resistance (and between any other points on the resistance), the difference of potential between any two points bearing the same relation to the voltage of the supply as the value of the resistance between the two points bears to the rest of the resistance in the circuit.

Supply Voltage

It will be easy to see that reducing the voltage of the supply decreases the difference of potential between any two points on the resistance (decreasing the supply voltage to zero would, of course, bring all the points to the same potential) while increasing the voltage of the supply has the opposite effect. It can easily be shown that in a "Simpler Wireless" set, a reduction or increase of a given percentage in the supply voltage will reduce or increase the difference of potential between any two points in the circuit by the same percentage.

In these sets the plates of all the valves are positive with respect to their own filaments while all the grids are negative. So that any reduction in the supply voltage reduces the positive potentials applied to the plates and also the negative potentials applied to the grids. In other words, a reduction in the supply voltage will result in the plates becoming more negative and the grids more positive.



"Simpler Wireless" Anode-bend Rectifier

On the other hand an increase in the supply voltage will increase the positive potentials of the plates and also the negative potentials of the grids. Moreover, these alterations of the grid and plate potentials will be of the same percentage as the alteration of the supply voltage. It is thus only a matter of seeing that the alterations of the grid voltages bear the correct relation-

(Continued on page 504)

WITHOUT FEAR OR FAVOUR



A Weekly Programme Criticism by Sydney A. Moseley

I WONDER why the operas have been dragging lately. It is a curious thing that these double broadcasts seem to result in the first performance being badly mistimed and the second performance of the same opera fits in according to plan. It would almost seem as if the first broadcast was in the nature of a dress rehearsal. And this, of course, shouldn't be. Both *La Tosca* and *Madame Butterfly* erred in this respect.

Fully aware that I am committing a sacrilegious affront to the myriads of opera lovers who weep every time they hear the heartrending story of Cho-Cho-San, I think that this opera does not broadcast so well as the others. I imagine the pathetic, if bulky, figure of the ill-treated heroine, the child and the 'orrid dagger must be seen as well as heard.

The singing, too, especially on the first performance, was not up to standard.

The hour of plantation songs, sung by Olive Kavann, Tom Kinniburgh, and the Wireless Chorus, was quite a pleasant affair. Both soloists can sing; and whoever can get tired of "The Old Banjo," "Ma Curly-headed Babby," "Croon, Croon, Underneath de Moon," and, indeed, "The Old Folks at Home"?

The pianists who fill up the intervals should be taken in hand by the announcers. What? Have I said that before? Well—but they couldn't have heard! Let me point out a fault which is pretty common. And that is the accompaniment to singing doesn't come through sufficiently loud. Often on a concert platform the reverse is the case, and I suppose it is in order to avoid the fault of over-emphasis that sometimes we hardly hear the pianists at all. I could give several instances, but it is more or less general.

The lady who sang "The Brightest Day" as an extra item hardly made it a brighter Saturday evening for us. Yet she was applauded by the claue in the studio. When will these dead-heads be abolished?

Harold Williams and the orchestra were not altogether on harmonious terms during the Prologue from *Pagliacci*. I wondered

why, too, the orchestra did not play the full introduction to the song, and so give the singer a good lead off. Why, half the beauty of this popular curtain-raiser is the three or four pages of orchestral introduction leading to a wonderful climax.

The religious services in the studio are becoming a feature, and I am glad; but the B.B.C. will have to seek more inspiring addresses than we have had lately. The right attention has been paid to the elocutionary powers of the preacher, but they all seem to tell us the old, old story, and repeat the same uninspiring prayers. Why can't we have new and spontaneous prayers as well as new and spontaneous addresses. I, for one, have been trying hard to enter into the spirit of these services, but I am afraid I shall have to close down on them.

Why does the official programme give the names of well-known foreign pieces and translate into English? Thus, Tchaikowsky's "Symphony Pathetique" is given as "The Pathetic Symphony." Pathetic

indeed! The foreign-name business, of course, can be overdone, and sometimes one is grateful for the use of English. But—"The Pathetic Symphony." Oh, dear!

Mr. Cecil J. Allen spoke on "1927—A Remarkable British Railway Year." If you like railways—yes.

Miss Gerda Nette appears to have caught on in her piano recitals. Although she is one of the big young artistes of Germany, we don't appear to have heard of her much in England; and here again the B.B.C. has performed a useful service.

I didn't wish to create the impression that the alternative programmes should each consist one of a high-brow and the other of low-brow music. Providing the music is good, we oughtn't to grumble. The other day we had Mozart from London and Mozart from 5GB. The alternative consisted in either hearing the Brosa String Quartet play him or the Symphony Orchestra at Queen's Hall. Personally, I chose some of each.

I suppose we shall have to peg away at the news bulletin farce before we obtain an improvement, but since we have succeeded in other directions we shall go on trying. The other night the news bulletin consisted of the history of a ship and the detailed account of the return of certain coke merchants from Germany. Enough to turn you to oil-burning!

When questioned recently on the subject of beam wireless, Mr. Coates, the New Zealand Premier, replied that he would wait until the permanent success of the system was assured before erecting a receiving station at a large capital expenditure for British official news from Rugby, which is at present cabled from Sydney for the New Zealand papers.

For the present, apart from the Königs-wusterhausen high-power transmitter, which nightly relays the capital's programmes, Berlin now possesses but one broadcasting station, namely Witzleben, on 483 metres. The Magdeburgerplatz transmitter (566 metres) was definitely withdrawn from service on September 20.



Mr. Percy Scholes, the Music Critic of the B.B.C.

MANY people are apt to think that a moving-coil speaker is a toy for the highly experienced amateur or the laboratory. In the past there has been a good deal of justification for this attitude. The average moving-coil speaker is distinctly less efficient than the horn type of speaker, or even than the cone type. Secondly, a certain fairly heavy power output is required from the amplifier in order to drive the diaphragm. This usually necessitates large amplifiers and, very important, large H.T. voltages, for the power output from a valve is dependent to a very considerable extent upon the anode voltage. With a given H.T. value the output is definitely limited, and many cases of distortion arise in practice due to the lack of appreciation of this point.

Increasing the Efficiency

If we wish to keep the amplifier simple, then it is necessary to reduce the power output required, and the only way of achieving this is by increasing the efficiency of the speaker. With reasonable care, this can be done, and in the present instance comfortable volume can be obtained from the speaker under conditions which can fairly be considered normal.

I have discussed in previous articles many of the points underlying the design of moving-coil speakers. In the first place, the use of a large coil is one of the principal factors contributing to greater efficiency, this being bound up with that of the air gap. A certain gap is necessary for adequate clearance, and the larger the coil, the less is the effect of this gap in relation to the other factors. The gap can be reduced to $\frac{1}{16}$ in., but this requires very careful



centering of the coil in order to ensure that it does not touch the magnet at any part of its travel. If the gap is increased to $\frac{1}{4}$ in., the problem becomes mechanically quite simple, but the efficiency will fall off seriously. In this instance, therefore, I have compromised by using a gap of $\frac{3}{8}$ in., and this has proved very satisfactory.

A high-resistance coil has been used, fed direct from the last valve through a choke-condenser filter to avoid the presence of the steady anode current in the coil itself. This again has proved to be a more satisfactory proposition, from the point of view of efficiency, than the use of a low-resistance coil. The coil itself is a little more difficult to wind, but the trouble is more than repaid by results obtained, for, as I mentioned in the articles describing the amplifier, the speaker is sufficiently sensitive to operate well with 150 volts

The "A.W." GRAMM MOVING-COIL LOUD-SPEAKER

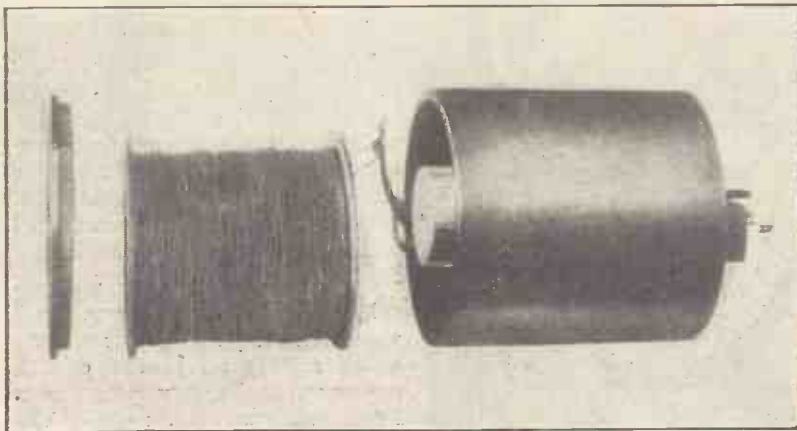
By J. H. REYNER,

A Loud-speaker suitable for use designed to operate from the "A.W." should see issues date

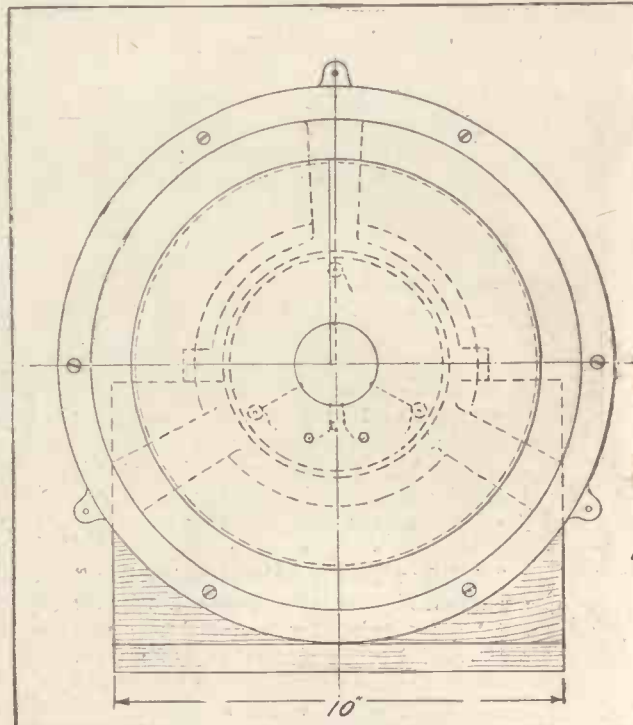
high tension only, using a normal super-power valve in the last stage.

Component Parts

Thus, as a result of paying attention to various details of this nature, we are able to bring the moving-coil loud-speaker within the realm of practical politics for the ordinary listener. The question to be considered next is that of the actual construction. Fortunately, this is now a rather simpler proposition. There are a number of firms who have embarked upon the produc-



The Parts of the Magnet



Front Elevation and Section of Gram

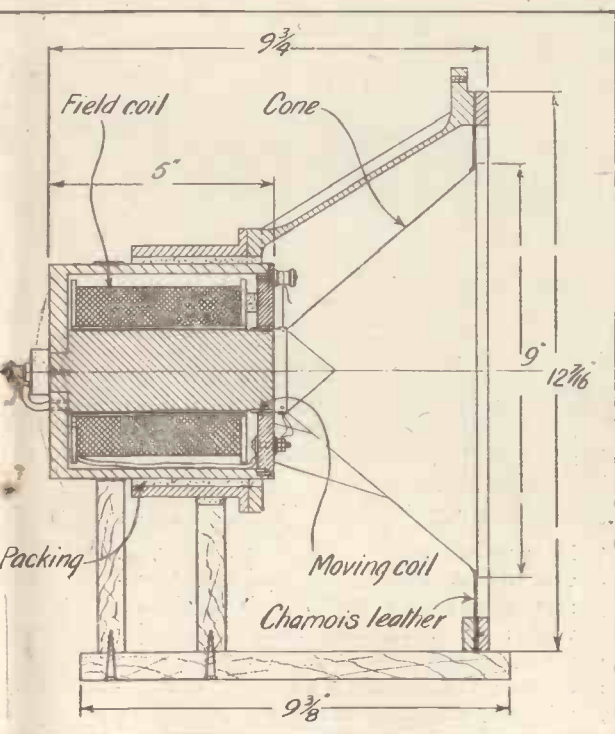
Amateur Wireless GRAMO-RADIO MAG-COIL SPEAKER

B.Sc. (Hons.), A.M.I.E.E.

with any powerful set, but particularly
"Gramo-Radio Receiver (new readers
d Sept. 24th and Oct. 1st).

tion of sets of parts whereby such a speaker can quickly be assembled. The present instrument has been assembled from such a kit which was supplied by Messrs. Star Engineering, of Didsbury, Manchester. The parts are also obtainable from Will Day Ltd., 19 Lisle Street, W.C.2, and A. Baker, 89 Selhurst Road, S.E.25. The kit consists of:—

1. A magnet unit comprising a nearly closed magnet, *i.e.*, circuit, the only air gap being that in which the coil resides. There is a centre core provided with a boss



Gramo-Radio Moving-coil Loud-speaker



is fixed. To the outside of the cone a circular piece of thin chamois leather is attached, the radial depth of this being about $1\frac{1}{2}$ in.

4. An aluminium framework consisting of two rings held together by means of screws. This same framework carries a cradle, which holds the magnet unit, the two being connected by stout webs.

Each of these parts may be obtained separately or, if desired, the reader can make some of them up for himself. In such cases the methods given in previous articles on moving-coil loud-speaker construction should be followed. In particular, the articles in Nos. 264 and 265 of AMATEUR WIRELESS should be referred to. In the present article, however, I shall assume that

the kit of parts has been obtained for the purpose. The total cost is under £5.

Assembly

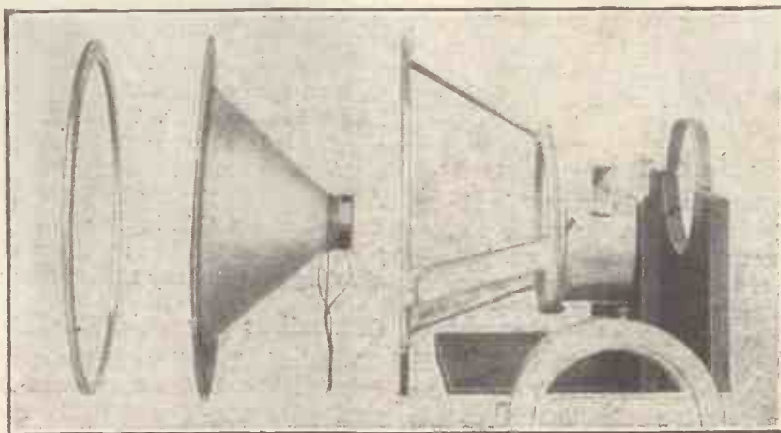
The first operation is the mounting of the diaphragm in the frame work. Remove the outer ring and place this downwards on a table. Then place the diaphragm on top, coils uppermost, and place the frame work over the whole. The holes in the diaphragm must of course register with those in the frame work. Then screw the whole together. The coil is provided with three cords of waxed floss silk (which is not greatly susceptible to atmospheric changes) spaced at equal intervals round the periphery. These are for centering the coil.

The ends of the winding are connected to small metal inserts from which lengths of stout wire are taken. Before assembling, clean the ends of these wires for a length of about half an inch. The next operation is the construction of a base carrying two wooden supports, as can be seen from the

$1\frac{1}{8}$ in. in diameter. Around this core is placed an energising winding which carries a small polarising current for producing the steady magnetic field. Around the whole is an iron shell, which is cast in one piece with the core, and which is completed by a disc fitting over the front and having a hole cut therein 2 in. in diameter, so that there is an annular gap $\frac{3}{8}$ in. wide left for the coil.

2. A coil wound on a light former, $1\frac{3}{8}$ in. inside diameter and a little more than $1\frac{1}{8}$ in. outside diameter. This is provided with cheeks at each end, forming a recess $\frac{3}{8}$ in. long. In this recess 1,500 turns of No. 47 gauge enamel-covered wire are placed.

3. A cone having a 9-in. outside diameter when made up. The apex of this cone is pushed through, forming a small re-entrant cone, $1\frac{3}{8}$ in. in diameter, to which the coil



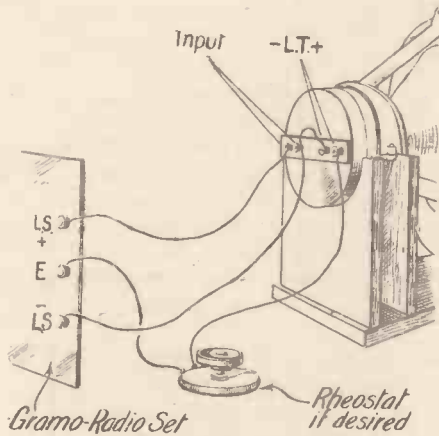
The Parts of the Framework and the Diaphragm

The "A.W." Gramo-Radio Moving-Coil Loud-speaker

(Continued from preceding page).

photographs and diagrams. With the supports placed in the position indicated, the centre of gravity of the whole instrument lies in between the two, so that no elaborate precautions are necessary for clamping the top. The rear end of the magnet is steadied by means of a saddle cut from a strip of metal screwed to the rear support.

Now mount the magnet unit in position. The cradle on the framework is made in two portions, held together by screws.



Connections of Set to Speaker

Undo these and remove the top half. Place the magnet unit in position, taking care that the three cords on the coil come opposite the three terminals on the front face of the unit. The two small terminals at the bottom of the front face are for connecting the coil to, and if all is correct these will come next to the connections from the coil itself.

Having ensured that the magnet is correctly placed, ease it forward, guiding the coil on the diaphragm into the gap. When this has been correctly set, replace the top half of the saddle and screw it home. Next place the whole instrument on the wooden base. The two supports will hold the magnet unit, while the bottom of the large-diameter ring supporting the outer edge of the cone will just rest on the base itself. Place the metal saddle previously referred to in position and screw it down to the rear support.

Centering the Coil

Before finally screwing everything home, slack off the screws in the saddle holding the magnet unit proper, and readjust the position of the magnet unit so that, when the diaphragm is in its normal position, the front edge of the coil is just flush with the front edge of the magnet unit. Then tighten up the saddle on the aluminium framework, and finally tighten up the steadying strip on the rear support.

The next operation is the centering of the coil. This is an operation which

requires a little care, but it remains set, once it has been properly adjusted. The three silk cords from the coil should be pulled just tight and placed under the terminals on the magnet unit. Then, by carefully tightening or loosening the various cords, the coil can be adjusted to float perfectly freely in the gap. The cords should not be pulled taut, or they will tend to increase the natural period of the diaphragm, in which case the reproduction of low notes will suffer to some extent and the efficiency of the speaker will also be impaired. When the diaphragm is quite free it can be tested by standing in front of it and blowing it gently. It should move back into the gap and return again without any apparent oscillation, the restoring force being just about sufficient to return the diaphragm to normal. In this condition we have the nearest approach to a non-resonant system that can be obtained.

Moving-coil Connections

Finally, connect the ends of the moving coil to the two small terminals at the bottom of the front face of the magnet unit. These two terminals are connected to the two terminals at the back, marked "Input," while the other two terminals are for the 6-volt battery.

Cabinet

It is now necessary to house the speaker in some form of cabinet or, alternatively, to provide it with a large baffle plate. This is most important, because otherwise the low tones produced by the movement of the diaphragm come off each side of the cone and interfere with each other, whereas by the provision of a baffle plate only the low notes from the front of the cone are radiated into the room. An effect similar to the baffle is obtained by placing the speaker in a box, enclosed on all sides, but preferably open at the back; if it is not open, there is a danger of box resonance at certain frequencies. The cabinet is a box with an open end having a 9-in. diameter hole cut in the front. The loud-speaker is inserted in this box, so that the diaphragm fits close up against the hole in the front. A fretwork front may be incorporated if desired, and a thin layer of silk may be placed behind the front without seriously affecting the efficiency of the arrangement.

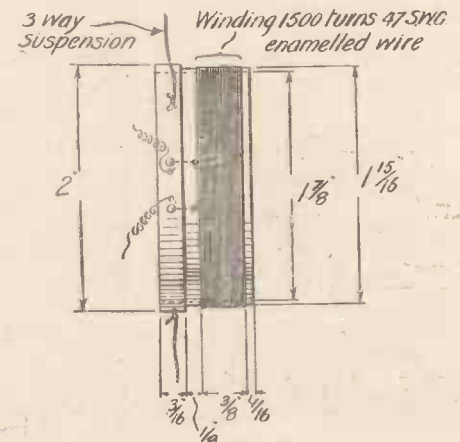
Connections

The final connections of the speaker are quite simple. If the instrument is to be used with the Gramo-Radio amplifier, described in the last issue, the negative L.T. terminal on the loud-speaker is connected to one of the input terminals. Three

leads are then taken from the amplifier from the terminals marked L.S.+, Earth, and L.S.—. The L.S.— terminal is taken to the two common terminals on the loud-speaker. The earth terminal is taken to the terminal on the loud-speaker marked L.T.+, since this obtains 6 volts from the receiver, while, finally, the L.S.+ terminal is taken to the other input terminal. These connections will be quite clear from the diagram given.

Current for Magnet

I shall say more in a further article concerning the use of this loud-speaker on D.C. mains. Those readers who have direct current available can run their magnet units on the mains directly, if they desire it. The normal magnet unit, however, is designed for use with a 6-volt battery, at which voltage 1 ampere is consumed. I have found that, for normal purposes, the current may be reduced somewhat without seriously affecting the results, so that an economy of current consumption can be obtained. To this end it is quite a good scheme to include a small rheostat (which may be of the baseboard-mounting type) in the lead from the 6-volt battery to the loud-speaker. This has been shown included in the diagram, and by suitable

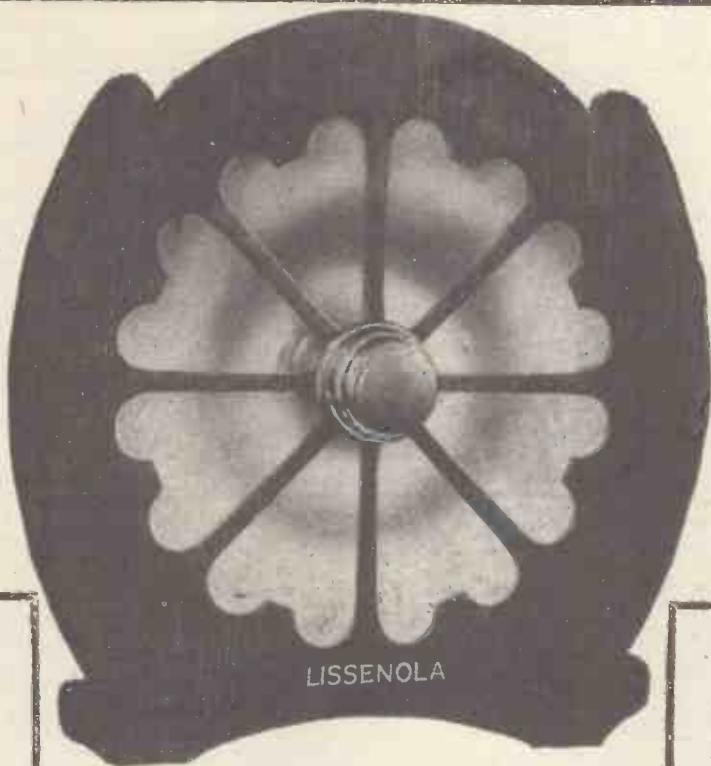


Details of Moving Coil

adjustment of this resistance a point can be obtained at which the strength is just not affected, which ensures the most economical running.

The Vienna broadcasting authorities have purchased the *Modernes Theatre*, in the Austrian capital, with a view to transforming it into a studio. It is considered that such a building must necessarily possess better acoustic properties than the average room usually utilised for transmissions, and that it will admirably lend itself for the performance of broadcast plays, to which a paying audience can be admitted.

NEW LISSEN LINES



LISSEN REVOLUTIONISING CONE

A combination of horn and cone in the same loud-speaker.

29/6

Fills in the missing note.

LISSEN RESISTANCE CAPACITY COUPLING UNIT

Provides a complete Resistance Capacity Coupling Unit. Includes two LISSEN Fixed Resistances and one LISSEN Mica Condenser. Values incorporated have been selected as the most suitable for general use, but the resistances are easily interchangeable. May be mounted upright or flat. **4/-**



LISSEN HEADPHONES

Never before was it thought possible commercially to make headphones so light and, at the same time, so sensitive. These headphones are so light they may be worn throughout an evening without the wearer realising they are on the head. Cords will not twist or tangle, but will always hang straight down, no matter how the head may be turned, moved, or twisted. The two earpieces are extremely sensitive and both are exactly matched in impedance. They settle at once into comfortable positions, and may be secured there by the single movement of a special 8/6 ball joint.

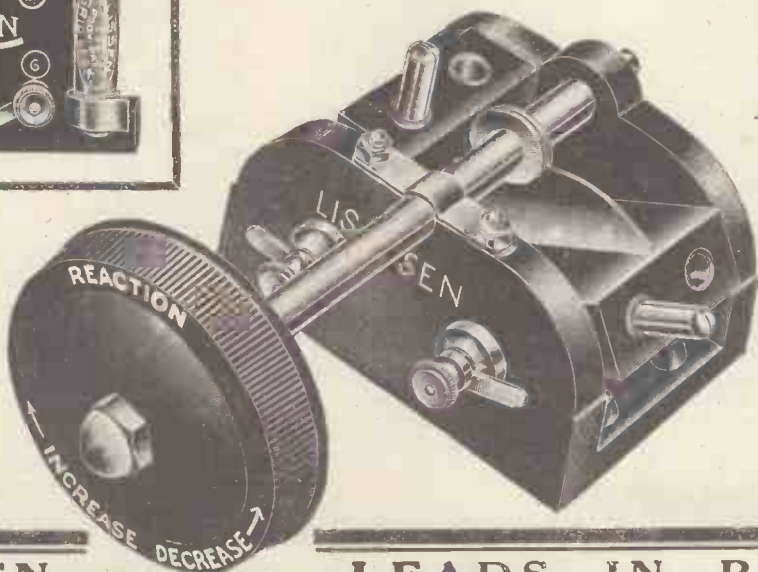


LISSEN COILHOLDER

Fine degree of control to permit of extremely selective tuning. Gear ratio selected as the best for all practical purposes. Big knob for comfortable finger grip and wide range of movement with one turn. No slip or backlash, coils will not move as the result of their own weight. No flexible connections to break. Moving block on the right-hand side, but may easily be changed over to left-hand side by following the simple instructions enclosed with each coilholder.

Model A, with 2-in spindle **4/6**

Model B, with 5-in. spindle **5/6**



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OUR INFORMATION BUREAU



RULES.—Please write distinctly and keep to the point. We reply promptly by post. Please give all necessary details. Ask one question at a time to ensure a prompt reply, and please put sketches, layouts, diagrams, etc. on separate sheets containing your name and address. See announcement below:

By-pass Condenser.

Q.—Why is a fixed condenser often placed across the primary winding of a first L.F. transformer and yet seldom across the primary of a second transformer?—C. N. B. (Whitby).

A.—At one time the primary windings of transformers were sometimes shunted by fixed condensers in order to improve the tone, but this is seldom necessary in the case of modern instruments. Nowadays a condenser is rarely placed across a transformer primary unless there is a magnetic reaction coil in series with the transformer. The condenser then ensures that the H.F. component of the plate current will not be choked back by the inductance of the transformer winding as if this happened it would be impossible to obtain reaction.—G. N.

Grid Bias with Potentiometer.

Q.—Is it practicable to use a potentiometer in order to obtain very fine control of the grid bias applied to an L.F. valve?—S. D. (Sussex).

A.—It would not be advisable to connect a potentiometer across the usual dry-cell type of grid-bias battery, but a potentiometer can be used in another, and more satisfactory, way for the purpose you mention. Connect the potentiometer winding across the L.T. battery and join the positive end of the G.B. battery to the potentiometer slider instead of L.T. negative, as is usual. Take a tapping from the G.B. battery to the return grid lead of the L.F. valve in question. Now you can adjust the G.B. roughly by altering the tapping point on the G.B. battery and finely by moving the potentiometer slider. The G.B. battery will not be exhausted any sooner than if the potentiometer were not used, but provision should be made for breaking the potentiometer circuit when the set is not in use in order to conserve the charge in the L.T. accumulator.—N. F.

Vulcanised Fibre.

Q.—Can vulcanised fibre be used to replace ebonite as an insulator in wireless sets?—T. L. N. (Heysham).

A.—This material can be used, but is not nearly so satisfactory as ebonite. When perfectly dry, its insulation resistance is quite high, but, unfortunately, the fibre is highly hygroscopic and readily absorbs considerable quantities of moisture from the atmosphere. This reduces its value as an insulator very much, especially for wireless purposes where reliability is such a desirable feature in the insulating material. The fibre is considerably cheaper than ebonite, of course, but it is not so easy to work and warps very easily.—G. N.

Valve Saturation.

Q.—What is meant by the "saturation" point of a valve and by "saturating" a valve?—D. S. H. (Oxford).

A.—The saturation point is the point on the characteristic curve of the valve where the curve ceases travelling upwards, bends over, and begins to travel in a horizontal line. This point is reached in practice when all the electrons being emitted by the filament are reaching the plate. When this happens, unless the filament temperature is increased, no

increase in either the plate voltage or the positive potential on the grid can cause any alteration of the anode current. A valve is said to be saturated when the signal voltages applied to its grid cause the operating point to move beyond the limits of the straight portion of the curve, whatever the mean potential of the grid.—N. F.

One-valve Set.

Q.—I have a single-valve set, detector with reaction, and am puzzled to find that with one particular size of reaction coil I can get reaction

the best I have heard or built, but I should like to know if by any means it can be the cause of this annoying noise.—W. M. (Purdleton).

A.—Probably the best way to be certain the trouble does not originate in the loud-speaker is to substitute another good make, if it is possible to borrow an instrument. If the trouble is still present, then possibly the combination of H.T. pressure and grid potential on one or more of the valves is not correct. Carefully check the settings by reading with a voltmeter while the set is working and compare with the values advised by the makers and in the article. If the output is very considerable, you may be asking too much of the last valve. This is possible, as you are apparently quite near the broadcasting station. Try detuning a bit.—D. H.

Binocular and Toroidal Coils.

Q.—It is claimed for both binocular and toroidal coils that they have little or no external field. Which of these two types of coil is the better?—C. N. K. (Cleethorpes).

A.—Both types of coil work on the same principle and, while the external field is not completely eliminated in the case of either, it is certainly much reduced in intensity and extent in the case of both. From the purely theoretical point of view the toroidal coil is undoubtedly superior, but from the mechanical point of view the binocular is much easier to make, while being nearly as good in practice. Taken all round, therefore, there is very little to choose between the two types of coil you mention.—N. F.

A Cause of Fading.

Q.—I have been told that the swinging of a receiving aerial in the wind may cause fading in the case of a distant station, especially on short wavelengths. Why should this be so?—R. P. S. (Dublin).

A.—In the case of a distant station, signals will, of course, be weak and on short wavelengths the tuning will be very critical. A slight alteration of the tuning when listening to a distant short-wave station may therefore be sufficient to cause the station to fade or even to disappear altogether. If the swinging of the aerial causes it to alter its distance from the various earthed bodies in its vicinity, it will cause the capacity of the aerial to earth to vary and will therefore upset the tuning of the aerial circuit.—N. G.

A Counterpoise.

Q.—When a counterpoise is used instead of a direct earth connection, is it necessary, for best results, that the counterpoise be an exact replica of the aerial system as regards the number and lengths of the wires used?—G. L. C. (Bedford).

A.—No attempt should be made to construct the counterpoise as a replica of the aerial. The counterpoise should form an efficient earth-screen, and should, therefore have as many wires as possible, and should also preferably extend beyond the limits of the aerial. All the wires of the counterpoise should, however, be of the same length and they should be evenly spaced. In other words, the counterpoise should be symmetrical and it should also be erected immediately beneath the aerial.—N. F.

When Asking Technical Queries—

PLEASE write briefly
and to the point

A Fee of One Shilling (postal order or postage stamps) must accompany each question and also a stamped, addressed envelope and the coupon which will be found on the last page.

Rough sketches and circuit diagrams can be provided, but it will be necessary to charge a special fee (which will be quoted upon request) for detail layouts and designs.

whichever way round this coil is connected. What could account for this?—R. I. (Birmingham).

A.—The coil with which you can get reaction with the connections either way round must have such inductance and self-capacity that its natural wavelength is similar to the wavelength to which the grid circuit is tuned. When this is the case, of course, the grid-plate capacity will act in such a way as to produce a reaction effect and this effect may be so strong as to more than counterbalance any negative reaction coupling owing to the coupling between the two coils being in the wrong sense.—N. F.

"Burnt-out" Transformer.

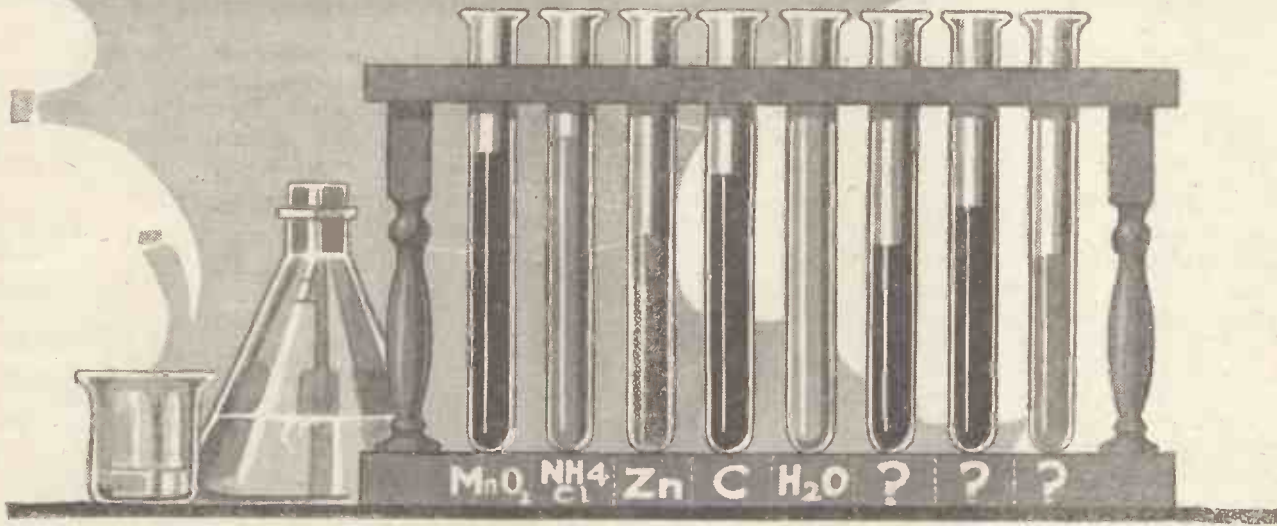
Q.—I have a faulty L.F. transformer and am told that it is "burnt out." I should be glad if you would explain exactly what this means, and what has caused it.—S. L. (Scarborough).

A.—The term "burnt out" is a term loosely applied to a fault in a transformer, loud-speaker, etc., which involves a break in the continuity of a winding. There is seldom any question of "burning." When sudden changes take place in the amount of current flowing through the wire, the interaction of the fields of the core and the winding throws a strain on the latter which tends to make it move. If some of the turns are free to move they may do so to such an extent that the winding is fractured.—G. N.

Loud-speaker Tinniness.

Q.—On certain high notes my loud-speaker creates a tinniness. I have had it tested, but the noises continue. It is coupled to a "Distance Getter" set, which was described in "A.W." some weeks ago. The set is undoubtedly

THE SECRET IN THE TEST TUBES



What are the secret chemicals ?

YOU KNOW THAT TEST TUBES and the minds of chemists have held secrets which have baffled discovery, but you may not know there have been none more sought after by battery makers than the one so jealously guarded inside each cell of the LISSEN New Process Battery, which makes each cell yield oxygen for your valves in a way *no other cell* does or has ever done before. Copious does not adequately describe this oxygen liberation of the LISSEN New Process Battery.

Since this new energy became available for valves tens of thousands of loud speakers all over the country are reproducing radio broadcast with a freshness of tone and a clear volume which is adding delight to radio. Whenever there is fine music to be heard by broadcast see that you have a LISSEN New Process Battery in your set and *hear your loud speaker voicing its appreciation.*

You pay shillings for this battery which many others would pay thousands of pounds for, yet 10,000 dealers are selling it at a price which has been made low to bring it within the reach of all.

The next time you want a good battery get a LISSEN New Process Battery. Take no other and you will be rewarded for your insistence by a new power smoothness and new tone clarity in your loud speaker.



LISSEN

SECRET PROCESS

BATTERY

Now 7/11
10/6
7/11

60 volts (reads 66) 7/11
100 volts (reads 108) - 12/11
9 volts (grid bias) - 1/6

LISSEN LIMITED, 16-20 FRIARS LANE, RICHMOND. Surrey

"A.W." TESTS OF APPARATUS

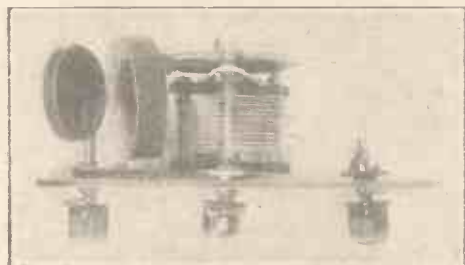
Conducted by our Technical Editor, J. H. REYNER, B.Sc.(Hons.), A.M.I.E.E.

Panel Plate Tuner Unit

A PANEL plate tuner unit sent in for test from S. A. Lamplugh, Ltd., King's Road, Tyseley, is an attractive assembly comprising an aerial tuning inductance covering a large range of wavelengths, a reaction coil operating over the entire range, a variable condenser with vernier motion and a push-pull switch for changing over from high to low wavelengths.

The whole is supplied with an engraved metal plate, which is fixed on the outside of the panel and presents a handsome and pleasing appearance. With the complete unit it is possible for the amateur to build up an attractive receiver having a professional appearance at a reasonable price.

Efficient results were obtained when we tested the unit in conjunction with a single-valve receiver. Sufficient reaction could be obtained throughout the tuning range which covers the lower broadcast band from 300 to 550 metres, and the higher



Lamplugh Panel Tuner

band from 1,000 to 2,000 metres. With a series condenser in the aerial circuit the minimum wavelength can be reduced below 250 metres, whilst the change over from low to high wavelengths is obtained by actuating the push-pull switch.

We have no hesitation in recommending the unit to constructors.

Powquip L.F. Transformer

A POWQUIP L.F. transformer received for test from The Power Equipment Co., Ltd., Kingsbury Works, The Hyde, Hendon, is a well-made and efficient article which should give good results in any L.F. amplifier. On account of its high-impedance primary winding, necessitating a moderate step-up ratio of 2-1, the component is particularly suitable when employed in the first stage of an amplifier.

Four terminals marked Pr, Po, Sr and So, are mounted on a rectangular piece of ebonite at the top of the component, whilst two metal angle brackets are fixed to the base, and serve as supports for

mounting to the baseboard or panel of a receiving set.

When tested in a low-frequency amplifier, good reproduction was obtained; no parasitic noises or distortion could be detected. On

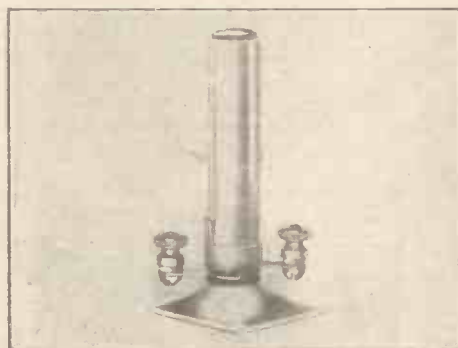


Powquip L.F. Transformer

account of its moderate price and good performance this component should appeal to readers.

Lisenin Plug-in Resistor

THIS component consists of a neat base of pressed metal carrying two concentric sockets. The resistor itself is made in the form of a cartridge about 2 in. long, fitted with a plug at one end and surrounded by a metal sheath. The ends of the resistance are taken to the plug and the outer sheath respectively. When the resistor is plugged into the holder the plug makes contact with the centre socket, while the sheath makes contact with the outer socket.



Lisenin Plug-in Resistor

The device is neat and a good contact is formed. It occupies very little space on the baseboard and the rapid interchange of resistors is made quite easy with this component.

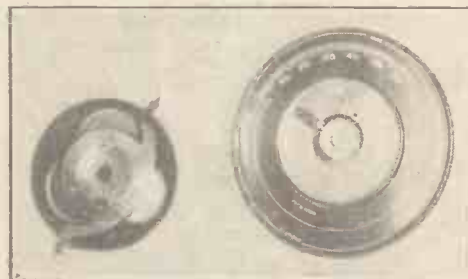
The resistor is supplied wound to various resistances. The particular sample supplied was rated at 12 ohms, and this was found

to be correct. The socket and resistor, which retail at 2s., are produced by the Lisenin Wireless Co., Connaught House, 1a Edgware Road, Marble Arch, W.2, and we think they will appeal to constructors.

Dialog Vernia Dial

THE Dialog Vernia Dial consists of a metal dial, painted black and engraved in white lettering. The vernier mechanism which is contained in the knob comprises three inclined copper discs bearing heavily on a central spindle fixed to the knob. When the dial is in position, one point on each inclined disc makes a firm contact with a large diameter brass disc, attached to the dial.

When the knob is rotated, the condenser spindle rotates with the vernier mechanism whilst the dial remains stationary. The reduction gear so obtained is approximately 6 to 1, and the motion is smooth with no tendency to slip.



Dialog Vernia Dial

Two indicators pointing in opposite directions to each other are attached to the vernier mechanism and rotate at the same speed as the condenser. We can recommend this component to readers. It is marketed by The Standard Insulator Co., Ltd., 77 Wells Street, W.1.

Following upon programmes provided by Corporation Tramway employees and railway employees, the Glasgow station is broadcasting on October 8, an entertainment arranged by the G.P.O., and entitled "The Postman's Knock." It will be carried out by people engaged in all branches of the postal service, and there are hopes that the introduction will be undertaken by the Postmaster Surveyor of Glasgow.

Commentaries on Scottish football matches are to be rather more restricted this season. A few of the most important Rugby games, cup semi-finals and finals, and internationals under the Association code, and one or two outstanding club games only will be broadcast.

Use **REDFERN'S**
REG. NO. 469456.
Ebonart
NON-METALLIC SURFACE EBONITE
RADIO PANELS

for

easy working, positive insulation, beautiful appearance, and an entire freedom from surface leakage. In black and beautiful mahogany grain, in nine standard sizes and prices. The "Ebonart Station Log Chart" given with each panel.

REDFERN'S
EBONITE H.F. CHOKE FORMER

With this Former and a reel of D.S.C. wire, the experimenter can make an efficient H.F. Choke.

Sold complete with base for either baseboard or horizontal mounting.

Price 2/6 each.

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Astonishes itself at Olympia!

ENQUIRIES and orders from all parts of the world have inundated us since the very first hour of opening at Olympia. The public interest shown in the new "EKCO" units has astonished even the optimistic "EKCO" manufacturers.

Since 1925, "EKCO," pioneers of mains power radio, have never deviated from their high standard of quality. This is the keynote of Olympia's astounding success. AND NOW the new "EKCO" has won home at its unbelievable price of 17/6.

Let us send you, free and post free, the new season's "EKCO" folders describing in full all "EKCO" models.

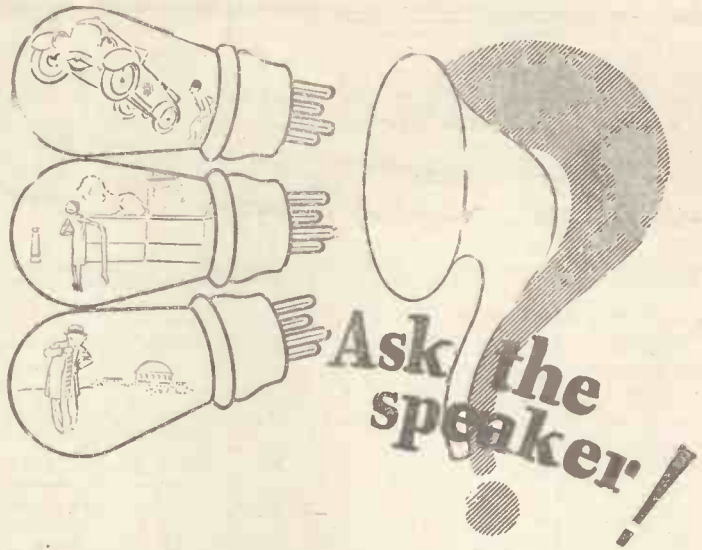
17/6 MODEL
 M.I., D.C.



'FOR EFFICIENCY-EKCONOMISE!'

Write Dept. "K"

ADVT. OF EKCOLE LTD EKCO WORKS, LONDON RD., LEIGH-ON-SEA



You don't buy a car purely because of the schoolgirl-complexion of its paint work.

Your wife doesn't buy her silk stockings upon the basis of how many times she could measure Nelson's Column with the thread unravelled from one of them.

Why, then, choose a valve because somebody tells you that there's enough wire in the grid to wrap three times round the Albert Hall?

Choose your valves because they are VALVES. Choose the valve which does all the things a valve ought to do. Choose Marconi—the valve which is designed, made and sold for its purpose; the valve which does it all better. You'll find the answer come out of the loud speaker.

You use a 6 volt accumulator?—then these are the valves that will give you the best results:—

FOR GENERAL PURPOSE
 Marconi Valve—Type D.E.H.610 (10/6) or D.E.L.610 (10/6)

FOR THE LAST STAGE
 Marconi Valve—Type D.E.P.610 (12/6)—a Power valve.

A full description of all Marconi valves and Marconi sets is contained in an amusing, but informative, free booklet entitled "Back Chat," shortly to be published. To secure a copy in advance send off at once the coupon below.

MARCONI VALVES
 —do everything that a valve should do

The Marconiphone Co. Ltd. (and reduced)
 210-212, Tottenham Court Road, London, W.1.
 Please send me, when published, my copy of "Back Chat." Thank you.

Name.....
 Address.....
 AW2..... Add stamp if unsealed

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

RADIOGRAMS



Mr. Eugene Corri and Mr. Bohun Lynch will together describe the Baldock v. Smith contest from the ringside at the Albert Hall, on October 6. The transmission is to be relayed to 2LO and 5XX at 10 p.m.

If any listeners have experienced that "after the holiday feeling," they will be interested in a talk, to be given by Mr. Filson Young on October 12, from the London studio. It is entitled *Coming back to work!*

It had been hoped to broadcast a performance of *The Lilac Domino* on October 12, but owing to copyright difficulties it has been found necessary to give *My Lady Molly*, an equally popular comedy opera, in its stead.

How a daily newspaper is produced is the subject of a broadcast to be made from the Newcastle station on October 11. A description will be given in simple language of the whole process of securing news items, editing, printing, publishing and distributing to the public.

On October 11, the speeches at the Conference of the National Council of Women will be relayed to the Bournemouth station from the Town Hall. Previous to this event, Malcolm Scott, "The Woman who Knows" will entertain at the studio.

Puccini's opera *La Boheme*, as performed by the British National Opera Company, at the King's Theatre, Edinburgh, will be relayed to 5GB Daventry Experimental, on October 15.

Most readers must be acquainted with the songs of Fred. E. Weatherly, K.C.; on October 13, he will tell 5GB listeners how some of them were written, interspersing the vocal illustrations with chat and recitations.

An application to the Bureau of Prohibition at Washington U.S.A. has been made by the National Broadcasting Co. for a permit to operate a still at the new transmitting station, now nearing completion, at Belmont, Long Island. It is required for maintaining a supply of distilled water to the giant valves!

A debate which should prove amusing, on the notion "that this country takes itself too seriously" will be broadcast from Manchester station on October 12. The mover will be Mr. P. Herbert Jones, president of the Manchester University Union, and the opposer, Mr. Victor H. Finney, M.A.

The artistes taking part in *Dancing Time* from 5GB on October 8, are Elsie Carlisle (entertainer), Geoffrey Gwyther (composer) and Pete Mandell (banjo). Mr. Gwyther

DO YOU KNOW?

1. What contact should be used with a carborundum crystal?
2. Of what is Wood's Metal made?
3. How much does a Russian wireless licence cost?
4. Which is the new relay station taking the Munich programmes?

Puzzle your friends with these queries: the answers will be given in next week's issue of "A.W."

Answers to Last Week's Queries: (1) A non-adhesive yellow insulating material used for protecting the windings of L.F. transformers and similar components. (2) The voltage amplification factor. (3) Three parts of water to one of acid. (4) Acid to water.

has appeared in several theatrical productions and has also been responsible for a good deal of variety entertainment which has been broadcast from London during the past year.

It is expected that the new relay transmitter now in course of erection at Linz (Austria) will be ready in time for the 1928 Easter programmes. The station is being built on the top of the Freinberg, the transmitting plant being housed in the



The Optimist!

buildings of the Aloisianum School. The programmes are to be relayed from Vienna by means of overhead cables. With the addition of the proposed Salzburg station next summer, the Ravag constructional programme will be completed.

Negotiations are taking place between *Radio-Polskie*, the Polish broadcasting company, *Radio-Journal* (Prague) and the *Ravag* (Vienna), with a view to a regular interchange of programmes between the respective capitals; these are to be effected by landline. Previous experiments proved so successful that it is expected that these international relays will become a regular feature of the programmes.

By arrangement with the *Union Internationale de Radiophonie*, at Geneva, the principal European broadcasting stations will transmit a special programme as a tribute to Great Britain on October 9. On November 6, most studios will dedicate their evening's entertainment to Czechoslovakia.

The Nauen (Germany) radio telegraphy station during the last two years has installed special short-wave transmitters for direct communication with Buenos Aires, Rio de Janeiro, Dutch West Indies, Cairo, Java, Manila and Mukden.

Broadcasting in Sweden has made considerable progress; in the month of August last some 4,000 more listeners subscribed to the service, bringing up the total number of licence holders to over 303,000. It is computed that every 20th Swede is now the possessor of a wireless receiver.

The old saying "num as an oyster" has been proved a myth during underwater radio experiments off the North Carolina coast, between Cape Hatteras and Cape Lookout. The oysters were so noisy that no other sound but that of the bivalves opening and shutting their shell-covered mouths came through the delicate instruments, and the experiments had to be abandoned.

The Metro-Goldwyn Corporation is planning a national land wire relay for the sale of radio moving picture programmes in the United States. The plan designates New York City as a central national broadcasting station. Clients would be radio broadcasting stations receiving the programmes by wire in a coast to coast transmission. It is expected that the system will be in operation not later than next February.

The Royal Choral Society has now issued its prospectus for this winter's season. Eight concerts are being provided, these including Handel's *Messiah*, Mendelssohn's *Elijah* and Elgar's *The Dream of Gerontius*, and *Hiawatha*. Are any of these to be broadcast we wonder? Many hundreds of thousands of listeners would be very grateful if the Society and the B.B.C. did come to some arrangement.



HITHERTO the attractive appearance and special convenience of the cone type speaker has had to balance a slight inferiority in reception as against the horn type. The Marconiphone organisation has not been disposed to accept this disability, and after years of research now introduce a Cone Speaker of such acute sensitivity as to equal any horn speaker. That is why it is honoured with the name which implies a *high standard satisfied*—Marconiphone.

**MARCONIPHONE
MODEL 75 CONE SPEAKER.**

Adjustment is controlled from the front, while the Cone, at the back, is amply protected. A feature of no little value is the ease with which it can be kept free from dust.

75/-

There is also the MARCONIPHONE MODEL 105 CABINET CONE—cone of pre-eminent performance and distinctive appearance—sensitivity enabling the extremes of the musical range to be completely audible.

105/-

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THE CONE OF SUPERIOR
PERFORMANCE

CONE SPEAKER

EVERYTHING **The S.E.C. your guarantee** ELECTRICAL

This New **2 Volt
Osram
Valve**

means

**Super Power
for Your Set!**

**DEP 240
Super Power Amplifying Valve**

Try this new valve in the last L.F. stage of your set to-day. You will be astounded at the immediate improvement in tonal quality.

The remarkable characteristics of the new OSRAM D.E.P. 240 stamp it as a Super-Power Valve far above the ordinary—and it requires a 2-volt (one-cell) accumulator only!

Particularly designed for use with Cone speakers

New **PRICE 20/-**
**Osram
Valves**

with the New Filament

Your Dealer can Supply!

MADE IN ENGLAND.

Advt. of The General Electric Co., Ltd., Magnet House, Kingsway, London, W.C.2.

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Winning
LOW LOSS
FORMER**

Be sure to specify Becol original Low Loss Former used in sets that have taken 1st, 2nd, 3rd and 4th prizes and gold medal. Packed in carton 3", 4", 6" lengths up to 36" lengths.

THE LATEST
Apply for particulars of 4 and 6 new design contact formers with bases.



Registered Trade Mark.

New Standard sizes in 3 finishes, guaranteed panels made by the Ebonite Experts,



THE BRITISH EBONITE COMPANY, LTD.
HANWELL, LONDON, W.7.

NO Trouble NO Danger
WHY WORRY about an Aerial
when you can get the

"HOVEY"
H O V E Y
SUPER AERIAL (Flat)



Indoor or Outdoor Portable.

OVERcomes Distortion!

OVERcomes Interference!

PRICE: **5/6**

"HOVEY"
Standard (round)

Indoor Size 12ft. by 2 1/2 ins. diameter. Best quality white insulated wire. Three round spreaders. Improved rubber insulators. Large terminal to attach to lead in. Neat appearance. Gives maximum results for crystal or valve sets. PRICE **2/6**

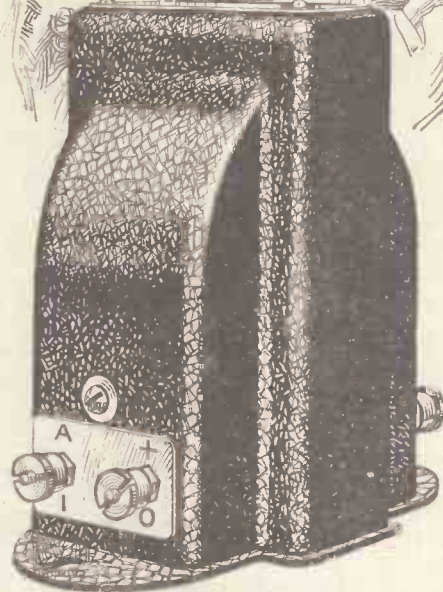
You must have an "HOVEY" Aerial if you want **OVERwhelming** results.

The HOVEY Aerial Co. 8 Red Lion Passage, W.1

Size 12ft. 2 1/2 in. diameter. Best quality white insulated wire. Three round spreaders. Improved rubber insulators. Large terminal to attach to lead in. Neat appearance. Gives maximum results for crystal or valve sets. PRICE **2/6**

"HOVEY"
Aerials
are obtainable at all Dealers. Get one **TO-DAY!**

EVERYTHING **The G. E. C.** ELECTRICAL
your guarantee



L.F. TRANSFORMER FACTS
Performance

GECOPHONE L. F. TRANSFORMERS give results as near perfect as it is possible to obtain. With a good loud-speaker such as the GECOPHONE CONE, the purity and natural tone is amazing, and sets using them have been given unstinted praise by such famous artistes and musicians as Dame Clara Butt, Miss Edith Day, Albert Sammons, De Groot and many others.

Reduced Prices

Ratio 2-1 ... 17/6 Ratio 4-1 ... 20/-

MADE IN ENGLAND

GECOPHONE

L.F. TRANSFORMERS
for volume and purity

Sold by all Wireless Dealers and Stores

Advt. of The General Electric Co. Ltd., Magnet House, Kingsway, London, W.C.2

Please Mention "A.W." When Corresponding with Advertisers

PANEL DESIGN

IT is rather peculiar how designers are apt to get into a groove. The American-type baseboard with vertical panel superseded the flat panel two or three years ago, and rapidly became deservedly popular. Since then there has been little change in panel design except the gradual disappearance of the former multitude of controls to attain the one-knob ideal.

Modern valve panels invariably follow the circuit design, that is, the high-frequency and detector stages with their accompanying controls to the left and the low-frequency circuits with, at the most, a switch or two and a volume control to the right.

Therefore the main tuning dial or dials requiring the most minute adjustments are set for the clumsy left hand to control while the right hand turns a switch on or rotates a volume control unless considerable gymnastic display is resorted to. Most certainly this is not as it should be, as about 95 per cent. of the population must be right-handed. Why not reverse things and have the main operating dials at the right end of the panel within easy manipulation of the more flexible right hand, leaving the low-frequency switches, etc. to the left hand?

This method lends itself very readily to construction and wiring up. When every component has been assembled and fixed to either panel or baseboard the wiring may be carried out at the back from left to right, following exactly the same direction as the circuit diagram from aerial to loud-speaker terminals or jack.

Try it in your next set. You will be surprised at the increased ease with which you will be able to manipulate the controls and how easily they seem to slip into the fingers.

"Charging Accumulators from A.C. Mains"

(Continued from page 477)

Experimenting with the rectifier, it was found that although the 2-microfarad condenser was across the contacts, the hum drowned all signals when the rectifier was connected direct to the filaments of the valves. If, however, the accumulator is also connected up, the hum is practically eliminated, and for fairly loud signals reception is quite good with only a little hum when the rectifier is going. The arrangement is shown in Fig. 5, and it was found that by arranging the charging current to be about the same as that taken by the valve filaments, it was possible to

run the valves indefinitely without discharging the accumulator. This arrangement works very well for loud-speaker work, and by keeping the A.C. leads well away from the receiver to avoid induction, the freedom from noise which can be obtained is remarkable. For weak signals the noises, of course, spoil reception.

In conclusion, when experimenting with A.C. mains using transformers it is necessary to protect the mains by suitable fuses in the primary circuit leads, as a short-circuit in the secondary circuit of the transformer may be as disastrous as a direct short of the actual mains. H. C. E.

The number of wireless operators licensed in the Soviet Republic is placed at 250,000, according to a recent report, but we imagine that the number must include receivers, as U.S.A. only has 30,000 operators!

According to the U.S. Bureau of Standards, WGY, the Schenectady station of the General Electric Company, has maintained its assigned frequency within a deviation of one-tenth per cent. for the last forty-nine months. The wavelength of WGY has been measured by the bureau 216 times, and it was the first standard frequency station announced, and has been continuously listed as a standard station.

CRACKLY NOISES
IS RADIO'S
WARNING
THAT YOU
NEED
FLUXITE
it simplifies soldering

FLUXITE
Soldering
Set—
Complete
7/6

All Hardware and Ironmongery Stores sell FLUXITE in tin, price 8d., 1/4 and 2/8. Another use for Fluxite—Hardening Tools and Case Hardening. Ask for booklet on improved methods.
FLUXITE, LTD.
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Rotherhithe, S.E.16.

THE BEST IN THE WEST

CAPTAIN ROUND'S latest screened valve as specified in the Wireless press and acknowledged to be the most wonderful valve yet produced.

Place your orders now.

Do not fail to call at our showrooms to hear a demonstration of the moving coil loud-speaker.

ALL PARTS IN STOCK

It will also pay you to hear a demonstration of the marvellous apparatus for electrical Gramophone reproduction.

Every type of pick-up can be demonstrated upon request. Brown, Igranic, Marconi, Celestion, etc. Latest devices and newest components always in stock.

Secure a copy of our latest catalogue just published (free to callers); by post 6d. to defray postage and packing.

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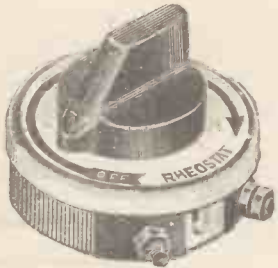
Igranic "XLLOS" (Extra Low Loss) Coils.



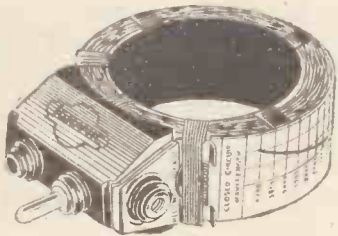
Igranic Fixed Condenser.



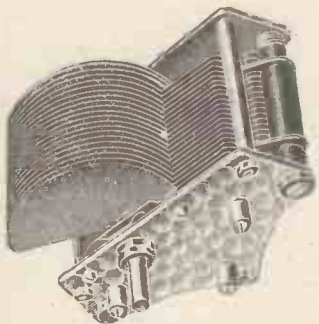
Igranic-Pacent Jackswitch.



Igranic-Pacent Porcelain Rheostat.



Igranic Triple Honeycomb Coil.



Igranic Low Loss Square Law Variable Condenser.

To build the best sets



are essential

You'll get perfect team-work in your set if you specify Igranic. Each component gives of the best—helps to obtain the best from the other components in the circuit, and the result is perfect team-work, without which even good constructional work is useless.

Here are interesting details of some of the illustrated components:—

Igranic Triple Honeycomb Coils.
The coils that set the world standard—and keep it. The new winding gives much lower self-capacity and H.F. Resistance. 17 standard sizes, giving wavelength range from 100 to 25,000 metres. Prices from 2/9 to 16/-.

Igranic "XLLOS" (Extra Low Loss) Coils.

The coils that live up to their name. Totally enclosed winding and with adjustable pin and socket to provide for wide-spaced mounting, two-pin and two-socket mounting, or pivotal mounting. In 10 sizes for wavelengths from 100 to 3,000 metres. Prices from 3/9 according to size.



If you have not already sent for this new Igranic publication which details the latest radio developments send for a copy to-day.

Igranic Low Loss Square Law Variable Condenser.
The choice of experts. A component of instrument precision. Prices: .00015 mfd. 12/- .0003 mfd. 14/6 .0005 mfd. 17/6 .001 mfd. 22/6

Igranic Fixed Condenser.
Its unique construction ensures that it is a fixed condenser in the truest sense of the word. Prices: .0001 mfd., .0002 mfd., .0003 mfd., .0005 mfd., .001 mfd and .002 mfd. 1/3 each .003 mfd. and .005 mfd. 1/6 each .006 mfd 2/- each .01 mfd. 2/6 each

Igranic-Pacent Jacks and Plugs.
A comprehensive range of well-designed, strongly-made devices too numerous to detail here. Prices moderate. The free booklet will tell you all about them.

Igranic-Pacent Porcelain Rheostat.
A really cheap and efficient valve control. Made with 2, 6, 10, 20, 30 or 50 ohms resistance. Price 2/6. Also made in Bakelite at 4/-.

Write for Publication D.63, which illustrates and describes the entire range

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Price 10/6

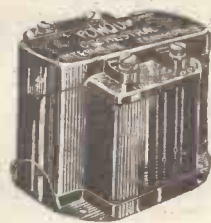
—is achieved by using Powquip Transformers, which reproduce music, song or speech without the slightest distortion. The unequalled performance of Powquip Transformers brings radio entertainment up to the highest pitch of perfection.

POWQUIP TRANSFORMERS

Guarantee Good Reception

A delighted user writes:—"This transformer has been in constant use ever since it was purchased; it has been used in our different circuits and in every case has given utmost satisfaction and purity unsurpassed."

ORCHESTRAL MODEL



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THE POWER EQUIPMENT CO. LTD., KINGSBURY WORKS, THE HYDE, HENDON, N.W.9

BE WARNED
in time!
TEST YOUR SET

SIFAM

RADIO METERS
Tell you everything
you should know
about your
set

NEW **MODEL**
POCKET **VOLTMETER**
Illustrated *below*
HIGH **9/6** **RESISTANCE**
4,000 **OHMS.**

MODERN Radio demands more than the sensitiveness of the human ear to regulate the tonal quality of reception. Use Sifam Radio Meters, they have set a new standard of accuracy for controlling plate and filament current, which enormously improves the performance of any set. Trace distortion, avoid waste of expensive batteries and prevent sudden failures.



Ask your dealer to show you the complete range of instruments.
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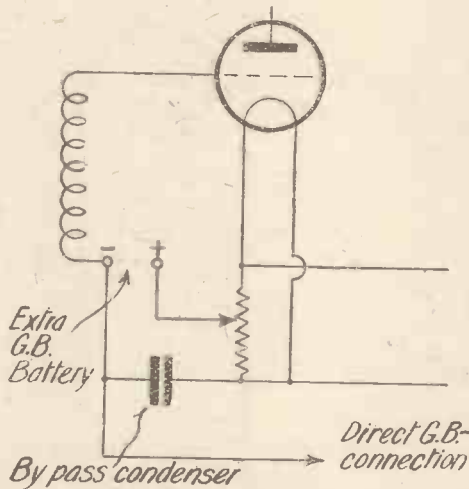
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"The All-purpose" Four
(Continued from page 467)

Two coil screens and bases (Lewcos).
Connecting wire (Glazite or Junit).
L.F. transformer, ratio 4-1 (Marconiphone, Ferranti or R.I. & Varley or Lissen).
Double-filament jack (Lotus).
Single-filament jack (Lotus).
L.S. plug (Lotus).
Three Vernier dials (Ormond).
Twelve terminals, one each marked: Aerial, Earth, H.T.+1, H.T.+2, H.T.—, L.T.+ , L.T.—, G.B.—1, G.B.—2, G.B.+ , —(Belling-Lee).

Construction
Reference to the reduced reproduction of the full-size blueprint (1s. 6d.), will give



Details of Grid-biasing Arrangements
a good general idea of the layout of the components.

On the panel are mounted the aerial-tuning condenser, H.F. transformer tuning condenser and reaction condenser, in the order named, from left to right. On the right of the slow-motion dials which control the variable condensers are the two loud-

speaker jacks for the three- or four-valve switching.
Looking from the back of the set the eight-terminal strip is mounted one inch from the left-hand end of the baseboard.
The eight battery terminals should be fitted in the order shown on the blueprint. The two smaller strips are mounted in convenient wiring positions farther along the baseboard. That adjacent to the terminal strip has mounted on it the two extra grid-bias terminals for "anode-bend" rectification.

The baseboard layout is simple, because all the components are well spaced. The six-pin Lewcos coil bases are mounted almost immediately behind the two tuning condensers as indicated. The main H.F. and detector components, i.e., the two Lewcos coils, neutrodyne condenser, valve holders and H.F. choke are more spaced out than the L.F. components, which comprise the R.C. coupler, L.F. transformer and remaining valve holders. The four variable fixed resistors and the potentiometer are fitted in a line near the terminal strips.

With the panel and terminal strips screwed to the baseboard, and the components mounted as indicated the task of wiring up can be undertaken.

The connection from the aerial terminal to the Lewcos coil base consists of a length of rubber-covered flex, so that coil connections 3 or 4 can be used at will.

Coils to use are: Aerial coil, Lewcos split-primary 250-550 metres, H.F. transformer, Lewcos split-primary 250-550 metre. Suitable valves: H.F. stage, DEH610, 410, or 210; Detector stage, DEH610, 410, or 210; First L.F. stage, DEL610, 410, or 210; Power stage, DEP610, 410, 210, or 240. These valves were actually used, but other well-known makes are being tested, and suitable alternatives will be given next week, together with a full test report.

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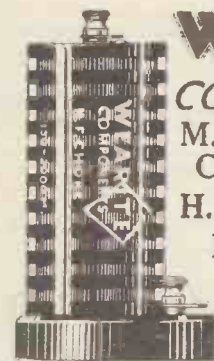
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Advertisers Appreciate Mention of "A.W." with Your Order

“SIMPLER WIRELESS”
The Cancel-out of Ripple Explained”

(Continued from page 486)

ship to the alterations of the plate voltages, bearing in mind the amplification factors of the valves, to ensure that a variation of the supply voltage shall have no effect on the anode currents.

To illustrate the point still further, take the case of a “Simpler Wireless” anode-bend rectifier, such as is shown diagrammatically in Fig. 3. The voltage applied to the plate of this valve will, neglecting the small voltage-drop across the L.F. choke, be 40. Suppose that the amplification factor of the valve is 20 and that the grid is 2 volts negative with respect to the filament.

Also suppose that the mains voltage is nominally 200, but that it is really fluctuating between 180 volts and 220 volts—that it is varying 10 per cent. on either side of its nominal value. Then the plate voltage of the valve will also vary 10 per cent. either way—between 36 and 44 volts. Also the grid voltage will fluctuate between 1.8 and 2.2 volts. Now, however, the plate voltage alters, the grid voltage will also alter, in the opposite sense, by one-twentieth the amount. As the amplification factor of the valve is 20, the variations in the mains potential will have no effect on the anode current of the valve.

Of course, the above example is not

supposed to represent an actual case, and it is perhaps as well to reiterate that the explanation given in this article is only intended to give readers a general idea of what happens without attempting to go into intricate details.

Also it should be stated that there is a limit to the amplitude of the “ripple” which can be eliminated in this manner, though the wave-form of the “ripple” is of no importance. It would be unreasonable for instance, to expect a “Simpler Wireless” set to work from rectified but unsmoothed single-phase A.C. as the supply voltage would fall to zero after each half-cycle.

However, the “Simpler Wireless” system enables a set to be worked directly from the usual D.C. electric-light supply (the “commutator ripple,” of which never causes the voltage to fluctuate as much as the 10 per cent. mentioned in the example given above) without any other form of smoothing device whatever. In the case of rectified A.C. it is only necessary to provide a very simple form of “smoother” to reduce the variations to a reasonable amount and the set itself will do the rest.

The “Simpler Wireless O-V-2.”

Readers who are thinking of build-

ing the “Simpler Wireless” three-valve set described in AMATEUR WIRELESS, No. 276, should note that instead of the resistance strips used in the original set and for which allowance is made in the blueprint, the Igranic Company is now supplying an improved form of resistance strip in which the distance between the centres of the fixing holes is 3 in. instead of two 2 in., as in the original strips. These new strips can be accommodated by leaving the centre valve-holder where it is shown in the blueprint and moving each of the other two valve holders 1 in. further away from the centre valve-holder. In the case of the new strips the fixing holes are provided with eyelets beneath which the ends of the resistance wire are clamped, thus simplifying the fixing of the strips in the set and making the contacts with the resistance windings more secure.

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The New KH1 Valve

WHEN the KL1 valve, which has separately-heated cathode, was first placed on the market it was received with considerable interest, and the consistently good performance of these valves when running off A.C. mains has shown that they are in every way a practical proposition.

It was, therefore, with the greatest interest that we tested the new KH1 valve; this retains the separately-heated cathode, but, by altering the design of the grid, the valve has been made specially suitable for use in high-frequency circuits. The values for the impedance and amplification factor not only show that the performance of this valve is good, but place the valve in the foremost rank of its class, since the impedance is about one half of what we have become accustomed to except with a high amplification factor.

We have no hesitation in saying that these valves should find a ready market, not only as high-frequency amplifiers, but as rectifiers and for use in R.C. stages.

The actual figures are as below:

| Anode Volts | Impedance | Amplification Factor |
|-------------|-----------|----------------------|
| 70 | 3,3000 | 35 |
| 110 | 3,3000 | 36 |

Both the DEP240 and the KH1 are manufactured by the Marconi Osram Valve Co., and are marketed by the General Electric Co., Ltd., as the Osram KH1 and

Osram DEP240, and by the Marconiphone Co., Ltd., as the Marconi KH1 and Marconi DEP240

"Three Exhibition Cameos"

(Continued from page 481).

S. L. S. (explains at full length, turning the whole sundry knobs and dials and finishes up with): And so, if at 3.45 a.m., you were sitting in your drawing-room, with this receiver in front of you, you could hear some of the best dance music from the New York hotels.

(They discuss the price, but notwithstanding a pressing invitation from the P. L. T. to buy the set, the W. D. Y. defers his decision and retires.

S. L. S. feverishly wipes a moist forehead and reassumes a bored expression. Ten minutes later he espies the W. D. Y. and the P. L. T. in the offing; in a few seconds, to his delight, they are again at the counter.

S. L. S. (charmingly): If there is any further information you may require, I shall be only too . . .

W. D. Y. (doubtfully): That's all right, old thing. I was just thinking, you know. Supposing I did not want to sit in the drawing-room at 3.45 a.m. I say—What do I do then?

S. L. S. gasps, clutches at the nearest carved pillar, which collapses; later, the Exhibition sweepers collect his remains.

JAY COOTE.

WARNING

TO HOME CONSTR JCTORS

MARCONI'S WIRELESS TELEGRAPH COMPANY, LIMITED, have recovered royalties and costs in respect of Wireless Receivers which were constructed by:—

- Mr. H. P. Finding, of Doncaster;
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- Mr. H. B. Evershed, of Woking;
- Mr. A. B. Summers, of Clacton; and
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and have also obtained undertakings from such persons not to infringe the Marconi Company's Patents in the future.

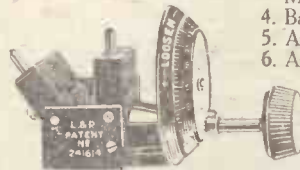
The leniency shown by the Marconi Company to the above persons will not necessarily be extended to others, for in future it is the intention of the Marconi Company to institute immediate legal proceedings against all infringers with a view to obtaining an injunction and damages against them. It must be borne in mind that an infringer is none the less liable to be restrained by injunction of the Court because he may have acted in ignorance of the Patent rights of the Marconi Company.

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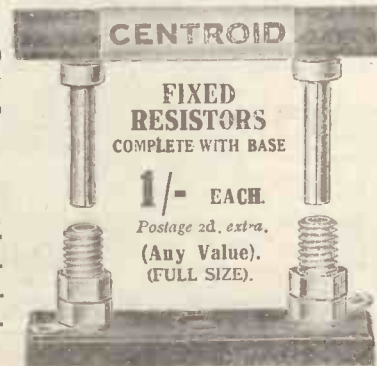
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Single - 10/-
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FIXED RESISTORS COMPLETE WITH BASE

1/- EACH
Postage 2d. extra.
(Any Value).
(FULL SIZE).

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GENEROUS TERMS TO THE TRADE.

THE CAMDEN ENGINEERING CO. LTD., Bayham Place, Camden Town, N.W.

"WHAT IS A GRAMOPHONE PICK-UP?"

(Continued from page 485)

shown in Fig. 3, in which the main outline has been reproduced, but the individual ripples, as it were, have been slurred over. This would result in a reproduction something like the original, but lacking the detail, and it is in this particular aspect that the modern electrically-produced record is distinctly superior to the older type.

Now an electrical pick-up is simply a modification of the ordinary sound box. In the case of the sound box, the movement of the needle imparts varying movements to a mica diaphragm, and this sets

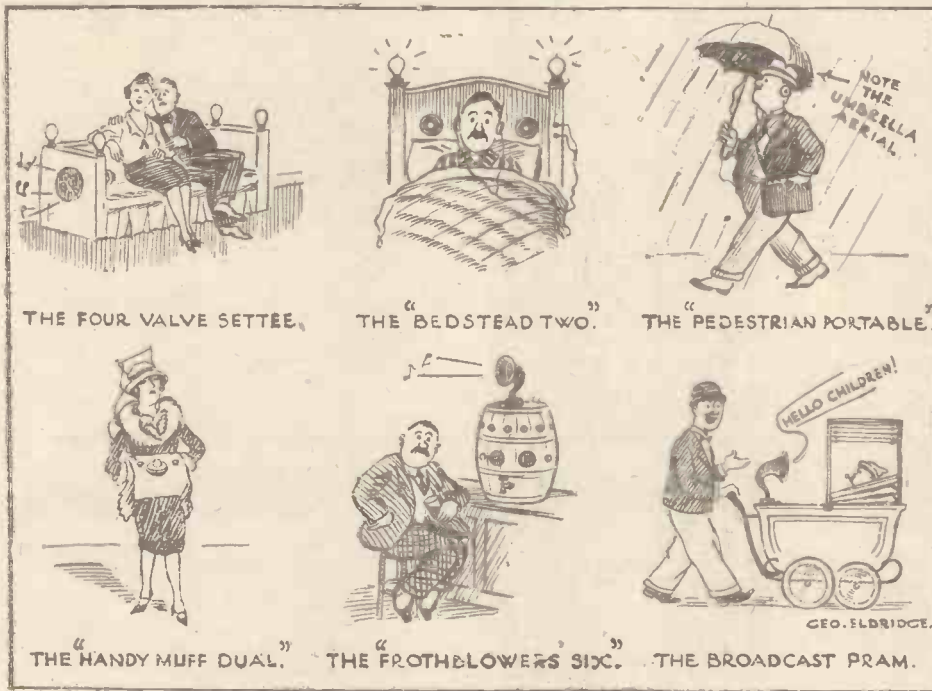
up air waves direct. In the electrical equivalent, the movement of the needle is caused to move a suitable armature in a magnetic field, as a result of which small currents are set up in pick-up coils associated with the field. A diagrammatic arrangement of the Phonovox pick-up is shown in Fig. 4. It will be seen that there is a nearly closed magnetic circuit, the only gap being a small one at the top. Running through the centre of the instrument is the armature carrying the needle at the bottom end, while the top of the armature has a small amount of play in the air gap. Round the armature itself is the pick-up coil, while a strong steady magnetic field is produced by a permanent magnet attached to the magnet system.

There is thus a steady magnetic flux flowing across the gap, and as long as this condition of affairs remains, no current is induced in the pick-up coil. The movement of the needle, however, due to the record upon which it is resting, causes the armature to move from side to side in the air gap and this varies the flux. As soon as this happens, currents are induced in the pick-up coil, which are a faithful reproduction of the movement of the needle. These currents can be amplified in the usual way, and caused to actuate a loud-speaker.

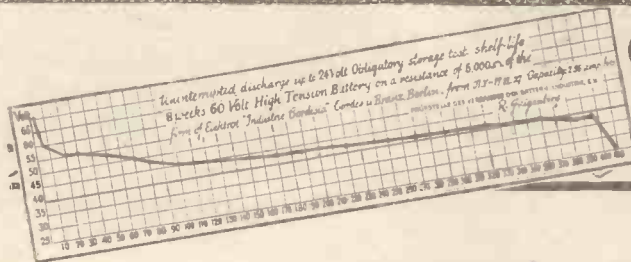
Obviously, the design of the pick-up must be such that, first of all it produces electrical currents which are faithful reproductions of the mechanical movements of the needle, and secondly, that it shall not introduce any additional currents due to vibrations of its own.

"LOW-FREQUENCY AMPLIFICATION"

THE above is the title of a handy little booklet which has recently been published by R. I. & Varley Ltd., well known to our readers as the manufacturers of many excellent components. Each of the several methods of L.F. amplification are dealt with in such a manner that even the non-expert reader will be able to understand the subject and be able to acquire the information by which it will be possible to make a choice of the method or methods to use. A large number of circuits are shown in explanation of the various couplings and in addition there are reproductions of curves obtained by the National Physical Laboratory which are of value in showing what excellent results it is actually possible to get. Copies of the booklet can be obtained by sending 1s. to Messrs. R. I. & Varley Ltd., 103 Kingsway, London, W.C.2, and mentioning AMATEUR WIRELESS.

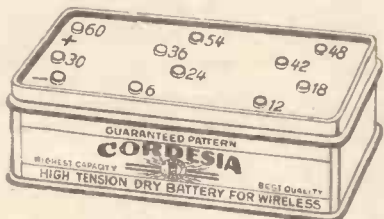


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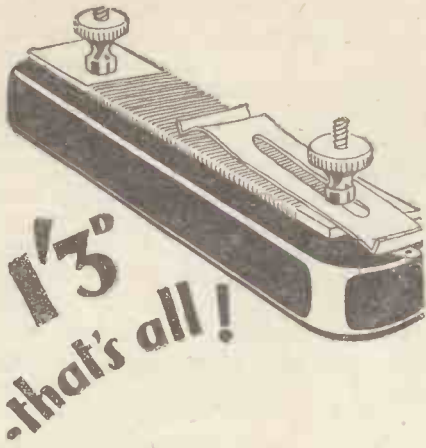
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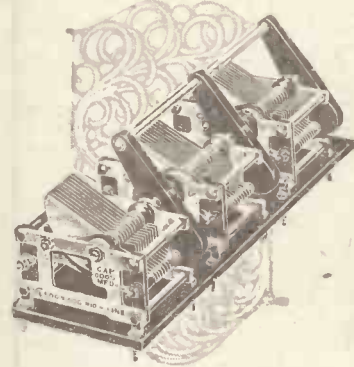
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CHIEF EVENTS OF THE WEEK

- LONDON AND DAVENTRY (5XX)**
- Oct. 9 Military band concert.
 - .. 10 *My Lady Molly*, a comedy opera.
 - .. 11 Light orchestral music.
 - .. 12 Popular concert relayed from the Albert Hall, Nottingham.
 - .. 13 Variety programme and plays.
 - .. 14 *Twelfth Night*, by a representative company of Old Vic. players.
 - .. 15 Concert relayed from the Wigmore Hall, London.
- DAVENTRY (5GB)**
- Oct. 9 Symphony concert.
 - .. 11 Orchestral concert.
 - .. 12 *The Magic Flute* (Mozart), played by the National Opera Company.
 - .. 14 *The Dogs of Devon*, a comic opera.
 - .. 15 *La Boheme*, by Puccini.
- BOURNEMOUTH**
- Oct. 11 National Council of Women's Conference, relayed from the Town Hall.
 - .. 13 Modern French music.
- MANCHESTER**
- Oct. 11 *The Intruder*, an original play, in one act.
 - .. 15 *Gates of Heaven*, a new play, in one act.
 - .. 15 A beaker full of the warm South—Spain: vocal and orchestral programme.
- NEWCASTLE**
- Oct. 10 A vocal and instrumental concert.
 - .. 11 How a daily newspaper is produced.
- ABERDEEN**
- Oct. 15 Lecture-recital on Hebridean songs of labour.
- BELFAST**
- Oct. 11 Glibert & Sullivan programme.

"IS IT ANODE BEND?"

(Continued from page 470)

have a certain voltage developed across the tuning circuit, and this is applied to the grid through the fixed condenser. Thus we have virtually a fixed condenser in series with the grid-to-filament capacity as illustrated in Fig. 3. The voltage will be divided across these two condensers in a certain proportion, this proportion being the inverse ratio of that capacity.

Thus, if we make the grid condenser very large, practically the whole of the voltage is developed across the grid circuit, whereas if we make it small, there is a certain voltage drop and the grid itself does not receive the full proportion of applied signal.

Some idea of the order of affairs can be gauged by considering actual values. A grid condenser as used for cumulative grid rectification has a value of about 300 micro-microfarads (.0003 μF). The grid-to-filament capacity of the valve is not the simple dielectric capacity between the electrodes, which is of the order of 6 to 12 micro-microfarads only, but is something considerably larger than this, due to the amplifying properties of the valve. Morecroft has shown that the effective capacity of a valve may easily be of the order of 60 to 80 micro-microfarads. In some modern circuits using high- μ valves the effective capacity may easily be considerably greater than this. If we assume that it is 100 micro-microfarads, then we have only 75 per cent. of the voltage developed across the grid itself, and it is here that we obtain a distinct difference in the form of anode-bend rectification obtained by connecting the grid leak to a grid-bias battery and the true anode-bend rectification where no grid condenser is interposed.

The Remedy

If circumstances necessitate the use of a condenser in the grid lead (as, for example, following a tuned-anode circuit in order to isolate the high potential from the grid), then this condenser itself should be made large and a value of at least .001 μF should be utilised. If this is done, then the rectification obtained is exactly the same as that obtained by the normal anode-bend circuit. With cumulative grid rectification, it is necessary to use a fairly small grid condenser, because the voltage built up for a given signal depends upon the value of this condenser, and, up to a point, the smaller this condenser can be made, the greater is the efficiency of rectification.

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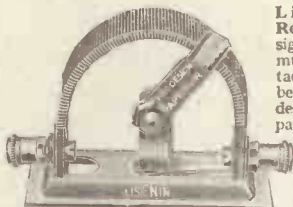
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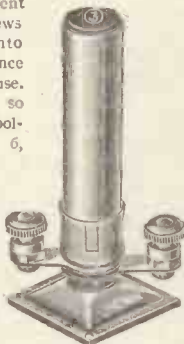
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The Loud-speaker

TO obtain the fullest advantage from the amplifier, described in last week's issue a moving-coil speaker is recommended. Results with an ordinary type of speaker however are very pleasing owing to the excellent qualities of the amplifier.

Better results can be obtained using a form of cone speaker, and, indeed, the use of this amplifier with one of the numerous speakers of this type now on the market forms quite a useful combination. A Celestion speaker, for example, will reproduce frequencies below 100 cycles per second quite well, with the result that the good qualities of the amplifier can be appreciated if an instrument of this character is employed.

With a moving-coil speaker, however, the results are surprising. In this issue is described a moving-coil speaker which can easily be constructed with quite a small amount of trouble and which forms the second unit in this receiver. The combination of a speaker of this type, with this particular amplifier, leaves very little to be desired. Both broadcast music and gramophone music are reproduced with extraordinary fidelity, particularly when the comparative simplicity of the amplifier itself is taken into account.

A few final words may perhaps be said concerning the use of the receiver on the two kinds of transmission. In order to receive broadcast programmes, the lever switch is placed in the up position, which connects the first valve to the tuning circuit, a grid condenser and leak being incorporated in the circuit to obtain the necessary rectification. The station required is then tuned in on the dial in the normal manner, and if it is inclined to be weak the strength may be increased by judicious use of the reaction control. As I mentioned last week, reaction should be used sparingly, and the best quality will result when practically no reaction is applied. With the ordinary plug-in coil, however, an appreciable amount of reaction can be used without affecting the side bands to a serious extent, but the actual adjustments must be left to the discretion of the reader.

For gramophone reception, place the lever switch in the down position, connect the pick-up to the two gramophone terminals immediately underneath the switch; start the gramophone, having previously inserted a needle in the pick-up, and play the record in the normal manner. The piece will be reproduced from the loud-speaker in a perfectly life-like manner.

In all cases, having adjusted the grid bias in the manner already given, i.e., 3 to 6 volts on the second valve and

24 volts on the last valve, keep the volume down so that the milliammeter needle is quite steady. If it flickers, overloading is taking place, and the input should be reduced by slacking back the reaction in the case of radio reception or by shunting a resistance across the input when using the pick-up. An occasional flicker on loud notes is permissible in practice, although theoretically the meter should be absolutely steady.

J. H. REYNER.

All Chinese owning a radio receiving set must register at one of the Government offices in charge of radio broadcasting. All sets must be purchased at licensed shops.

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Contributions are always welcome, will be promptly considered, and if used will be paid for. Queries should be addressed to the Editor, and the conditions printed at the head of "Our Information Bureau" should be closely observed. Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58/61, Fetter Lane, London, E.C.4.

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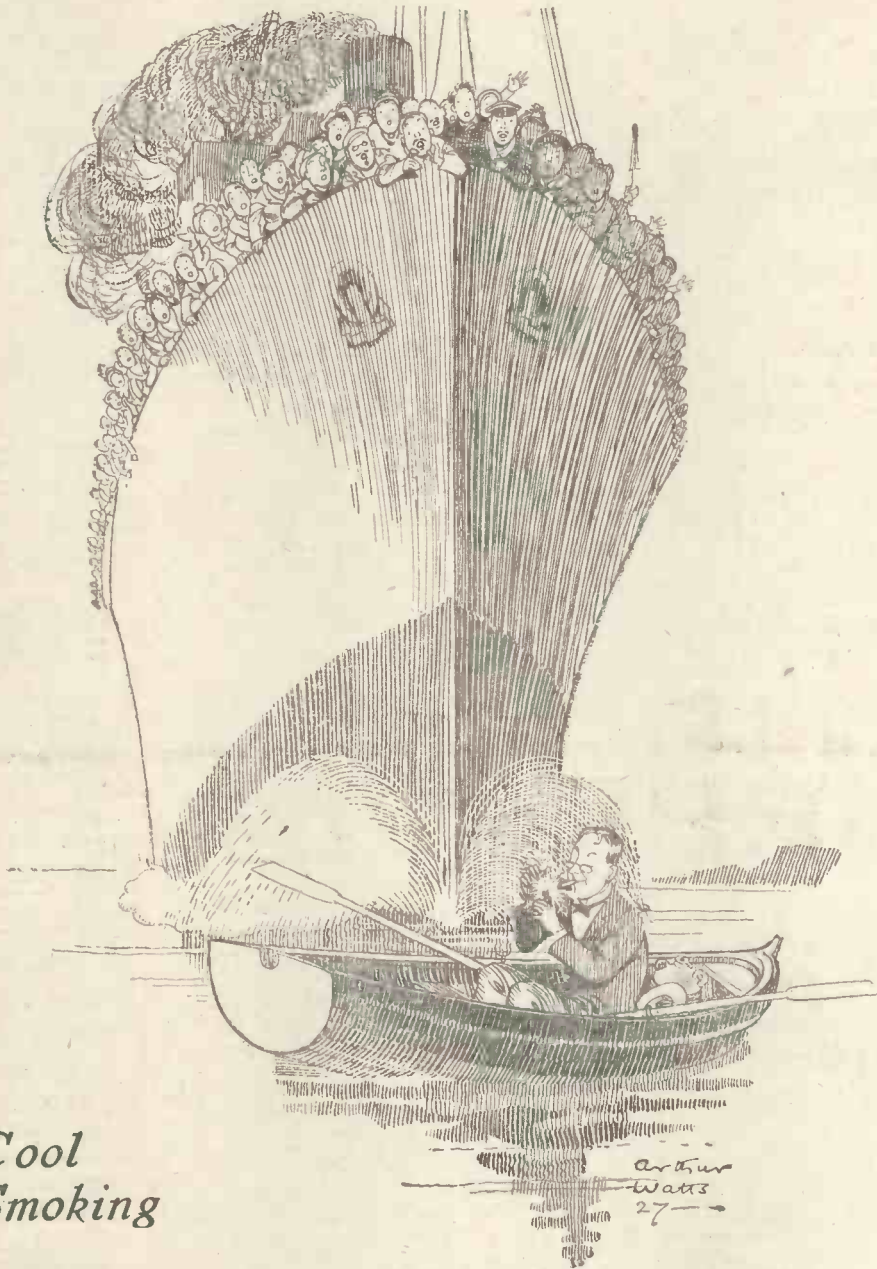
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TRADE BREVITIES

A SALES conference was held by the Mullard Wireless Service Co., Ltd., on Saturday, September 17, at the Holborn Restaurant, Mr. S. R. Mullard presiding. Seventy-five depot managers, representatives, and members of the sales staff were in attendance, when the policy of the Mullard Company for the forthcoming season was discussed.

Benjamin Electric, Ltd., Brantwood Works, Tariff Road, Tottenham, N.17, inform us that Mr. H. L. Smith, their Yorkshire representative, will in future devote his activities to Benjamin business on the Continent, and that his duties in Yorkshire, Durham and Northumberland will be taken over by Mr. F. G. W. Towers.

This month's "Brown Budget" (issued by S. G. Brown, Ltd., North Acton), is as usual, full of interesting items.

Will the trade, and readers also, note that Messrs. Wright & Weaire, Ltd., 740 High Road, Tottenham, N.17, are now the sole distributors of Paxolin tubes and panels.

The Magnum radio components produced by Burne-Jones and Co., Ltd., of Magnum House, 288 Borough High Street, S.E.1, are described in a 36-page booklet which we have received.

We have received from the agents of the Tungstone Accumulator Co., J. Haddon and Co., Salisbury Square, Fleet Street, E.C.4, a copy of "Battery Troubles Solved," a closely packed booklet of 112 pages, in which an imposing array of facts and information regarding the accumulator is set out. These accumulators have many noticeable features and are worth inquiries from listeners-in and motorists.

English & Amateur Mechanics

Contents for October 7th, 1927

"Making Holland One-tenth Larger" As the title of the leading article in this week's *English and Amateur Mechanics* (3d.), describing the wonderful scheme now in operation for reclaiming the whole of the Zuyder Zee, thus adding 1,000 square miles to the area of Holland. A Remarkable Clock, which is not only an excellent timekeeper, but which indicates no less than seventeen general and astronomical facts, is also described in this issue. In addition, the contents include "A REMARKABLE NEW WIRELESS RECTIFIER," "WIRELESS HINTS FOR THE CONSTRUCTOR," "MAKING A KITCHENETTE FROM AN OLD DRESSER," "HOW TO MAKE A PHOTOGRAPHIC ENLARGER," "MAKING YOUR CEILING ONE BIG CLOCK FACE," "GETTING RID OF THE DUST IN ENGINEERING WORKS," Etc., Etc.

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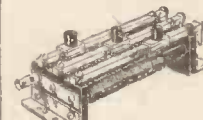
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Here is a free offer to all Battery users which shouldn't be missed. Just send a 1 1/2 stamp to the address below and receive by return a valuable 20 page booklet dealing with the wonderful ETON primary H.T. Battery. This offer is only for a limited period so write off TO-DAY to the
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1, 2, 3, 4, 5 or 6 valves perfectly and independently controlled by cas unit.

A multiple unit superseding the fixed Resistor can be used in any circuit to control any number of valves. For downright efficiency use a LORIOSTAT in your set.

6, 15 or 37ohms
1 way 2/- 4 way 7/3
2 " 3/6 5 " 9/-
3 " 5/6 6 " 10/3

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With ebonite ends and 4" Trolite Dial.
"005 5/9 "003 5/6
Vernier Dial 1/6 extra.
Post Free.

J. H. TAYLOR & CO.
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Anode Converters, 400 volts, £4 10s. Charging Valve Bargains: B.T.H., Cosor, etc., A.C. to D.C. 50 milliamps at 200 volts to 1,200 volts, cost 35/- Sale 8/6. guaranteed. Switches, 250-volt Tumblers, 6d. 8-way Lucas for Phone or Speaker Circuits, 3/6. S.K. Amplifier Micro. Units 2,000 ohms. 13-. Buttons, 1/- Western Electric Loud Speakers. 15/-. Violins, 25/-. Sullivan Headphones, 3/-. Single Phone, 1/6. Rubber Ear Pads, 4d. per pair. Gramo. Pick-ups, 21/-. Gyroscopes, 15/-. Mains Smoothing Chokes, 1/- 2-mfd. Condensers, 2/6. Remote Relays, 10/-. Pear-Pushes, 6d. Sterling 1-Valve Amplifiers, 22/6. 2-v. T.B. Amplifiers, 32/6. Inert Fuller. 1 1/2 cells, 1/- Thermo A.C. Meters, 250 m.a. 15/- 4-range B21 Testers, A.C. or D.C. 200 m.a. 4 amps. 6 v., 120 v., 40-. Large Steel Horseshoe Magnets for Coil Speakers, 3/6. Bargain Sale of Transmitters and Receivers, 1 to 6 Valves, now on. Send 4d. for our Sept. edition of illustrated catalogue. It will save £1.

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Amateur Wireless

COUPON

Available until Saturday.

Oct. 15th, 1927

**Your
T.C.C. Condensers
now cost you less**

NOW there is no excuse whatever for buying a cheap condenser. For T.C.C. Condensers are reduced in price. It costs you less, now, to buy the finest condensers made—condensers that are guaranteed up to the hilt. In capacity and in insulation. Ask for T.C.C. Condensers—in the green cases. Green for safety!

Here are the Reduced Prices:

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| Capacity Mfds. | Prices | | Capacity Mfds. | Prices | |
|----------------------|--------|-----|----------------|--------|------|
| | Old | New | | Old | New |
| '0001-'0009 S/P type | 2/10 | 2/4 | 1 | 9/- | 8/- |
| '0001-'0009 | 2/4 | 2/4 | 125 | 10/9 | 9/6 |
| '001-'004 | 2/4 | 2/4 | 15 | 12/6 | 11/- |
| '005-'009 | 3/- | 3/- | 2 | 16/- | 14/6 |
| '01 | 3/6 | 3/6 | 25 | 19/6 | 18/- |
| '05 | 5/8 | 5/6 | 3 | 23/- | 21/6 |

Mansbridge Condensers.

| Capacity Mfds. | Prices | | Capacity Mfds. | Prices | |
|-----------------|--------|------|----------------|--------|------|
| | Old | New | | Old | New |
| '005-'009 | 2/- | 1/8 | 2 | 4/8 | 3/10 |
| '01-'09 | 2/4 | 1/9 | 3 | 7/- | 6/6 |
| 1 | 2/6 | 1/10 | 4 | 9/- | 7/6 |
| 25 | 3/- | 2/3 | 5 | 11/- | 9/6 |
| 1 | 3/- | 2/3 | 6 | 13/- | 11/6 |
| 3 | 3/4 | 2/7 | 8 | 17/- | 14/9 |
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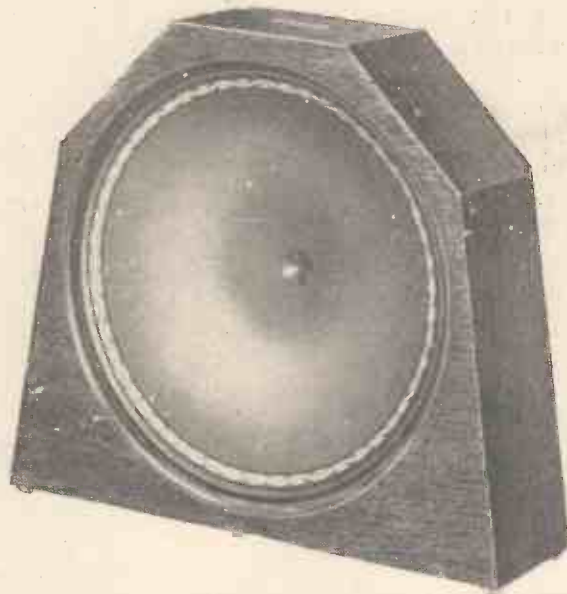


**T.C.C.
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Always dependable

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9655

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90/-**




*is all you need
pay for a hand-
some Hornless
Loud Speaker*

THERE's no need now to pay a high price for your Loud Speaker. Only ninety shillings will buy an instrument which will satisfy the most discriminating ear and the most fastidious eye. The Brown Mascot Loud Speaker is unrivalled at its price both in performance and appearance. It will give you—now and always—a reproduction that is so true that it can only be compared with the original. That is unmatched, in its class, in the purity of its tone, and unequalled in the majesty of its volume.

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Twelve Shillings

The climax of our long and specialised experience in condenser manufacture has been reached in the K.C. Variable Condenser shown above. Both electrically and mechanically, this is a perfect instrument in which the elimination of losses and the provision of selective tuning have been the two features chiefly held in view.

Both stator and rotor vanes are of heavy gauge brass, separated by accurately turned spacers. The stator vanes are insulated by bakelite pillars held in compression, and the rotor vanes are connected to the frame—these features making for extremely low losses.

When used in conjunction with either of the DUBILIER Toroids, this Condenser will give true kilocycle (S.L.F.) tuning. This means that radio stations will be received—not crowded together at one end of the scale,—but evenly spread out throughout the dial readings. One-hole fixing is provided and the instrument as a whole is beautifully finished.

Our new and improved methods of manufacture have enabled us to produce this Condenser at the extremely modest price of 12/-, and the enthusiasm which has already been accorded to it on all hands proves clearly that the DUBILIER K.C. Condenser will take up its rightful position as the premier variable condenser of the new season.

One hole fixing. Max Capacity 0.0005 mfd. Slow motion reduction 200 to 1.



Adopt. of the Dubilier-Condenser Co. (1925) Ltd., Ducon Works, Victoria Road, North Acton, W.3

I.C.47